

Model 01FL Cyclo-Kinetic[®] Flat-Line Powder Coating Booth

Customer Product Manual
Part 229 808C



NORDSON CORPORATION • AMHERST, OHIO • USA

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Table of Contents

1. Safety	1
Qualified Personnel	1
Intended Use	1
Regulations and Approvals	1
Personal Safety	2
Fire Safety	2
Action in the Event of a Malfunction	3
Disposal	3
2. Description	4
System Operation	4
Safety Features	5
Flame Detector Indicator/Relay Panel	5
Deflagration Vent	5
System Operation Illustration	6
3. Operation	7
System Components	7
Initial System Setup	9
Feed-Hopper Level Sensor Calibration	11
Vent-Assist Air Pressure Adjustment	13
Daily Startup	13
Daily Shutdown	14
Color Change	15

4. Maintenance	16
Daily Cleaning	16
Daily Maintenance	17
Air Velocity	17
Filters	17
Rotary Sieve	18
Transfer Pumps	18
Powder Guns	18
Powder Pumps	18
Flame Detector Indicator/Relay Panel	18
Compressed Air Supply	19
Air Dryers	19
Gun Movers (Oscillators and Reciprocators)	19
Sieve Accumulator and Vent Hose	19
Workpiece and Conveyor Grounds	19
Weekly Maintenance	20
Enclosure	20
Collector Module	20
Fan Compartment	20
Cartridge Filters	20
Transfer Pump	21
Powder Guns and Cables	21
Powder Pumps and Feed Hoses	21
Feed Hopper	21
Air Knife Blower (Optional Equipment)	21

Periodic Maintenance	22
Electrical Connections	22
Spray Guns	22
Air Dryer	22
Gaskets	22
Exhaust Fan V-belts	22
Bearings	22
Rotary Sieves	23
Differential Pressure Gauges	23
Powder Feed and Transfer Hoses	23
Wheels and Casters	23
Maintenance Check List	24
5. Troubleshooting	25
Troubleshooting Chart	26
Reversing Motor Direction	33
6. Repair	33
Final Filter Replacement	33
Cartridge Filter Replacement	35
Pulse Valve Replacement	37
V-Belt Replacement	39
Sheave Replacement	41
Motor Replacement	44
Fan, Fan Shaft, and Bearing Replacement	45
7. Parts	49
Using the Illustrated Parts List	49
Final Filters and Mounting Hardware	50
Cartridge Filters	51
Pulse Valves	52
Fan and Fan Drive	54

Model 01FL Cyclo-Kinetic Flat-Line Powder Coating Booth

1. Safety

Read and follow these safety instructions. Task- and equipment-specific warnings, cautions, and instructions are included in equipment documentation where appropriate.

Make sure all equipment documentation, including these instructions, is accessible to all persons operating or servicing equipment.

Qualified Personnel

Equipment owners are responsible for making sure that Nordson equipment is installed, operated, and serviced by qualified personnel. Qualified personnel are those employees or contractors who are trained to safely perform their assigned tasks. They are familiar with all relevant safety rules and regulations and are physically capable of performing their assigned tasks.

Intended Use

Use of Nordson equipment in ways other than those described in the documentation supplied with the equipment may result in injury to persons or damage to property.

Some examples of unintended use of equipment include

- using incompatible materials
- making unauthorized modifications
- removing or bypassing safety guards or interlocks
- using incompatible or damaged parts
- using unapproved auxiliary equipment
- operating equipment in excess of maximum ratings

Regulations and Approvals

Make sure all equipment is rated and approved for the environment in which it is used. Any approvals obtained for Nordson equipment will be voided if instructions for installation, operation, and service are not followed.

Personal Safety

To prevent injury follow these instructions.

- Do not operate or service equipment unless you are qualified.
- Do not operate equipment unless safety guards, doors, or covers are intact and automatic interlocks are operating properly. Do not bypass or disarm any safety devices.
- Keep clear of moving equipment. Before adjusting or servicing any moving equipment, shut off the power supply and wait until the equipment comes to a complete stop. Lock out power and secure the equipment to prevent unexpected movement.
- Relieve (bleed off) hydraulic and pneumatic pressure before adjusting or servicing pressurized systems or components. Disconnect, lock out, and tag switches before servicing electrical equipment.
- While operating manual electrostatic spray guns, make sure you are grounded. Wear electrically conductive gloves or a grounding strap connected to the gun handle or other true earth ground. Do not wear or carry metallic objects such as jewelry or tools.
- If you receive even a slight electrical shock, shut down all electrical or electrostatic equipment immediately. Do not restart the equipment until the problem has been identified and corrected.
- Obtain and read Material Safety Data Sheets (MSDS) for all materials used. Follow the manufacturer's instructions for safe handling and use of materials, and use recommended personal protection devices.
- To prevent injury, be aware of less-obvious dangers in the workplace that often cannot be completely eliminated, such as hot surfaces, sharp edges, energized electrical circuits, and moving parts that cannot be enclosed or otherwise guarded for practical reasons.

Fire Safety

To avoid a fire or explosion, follow these instructions.

- Ground all conductive equipment in the spray area. Check equipment and workpiece grounding devices regularly. Resistance to ground must not exceed one megohm.
- Shut down all equipment immediately if you notice static sparking or arcing. Do not restart the equipment until the cause has been identified and corrected.

- Do not smoke, weld, grind, or use open flames where flammable materials are being used or stored.
- Provide adequate ventilation to prevent dangerous concentrations of volatile materials or vapors. Refer to local codes or your material MSDS for guidance.
- Do not disconnect live electrical circuits while working with flammable materials. Shut off power at a disconnect switch first to prevent sparking.
- Know where emergency stop buttons, shutoff valves, and fire extinguishers are located. If a fire starts in a spray booth, immediately shut off the spray system and exhaust fans.
- Shut off electrostatic power and ground the charging system before adjusting, cleaning, or repairing electrostatic equipment.
- Clean, maintain, test, and repair equipment according to the instructions in your equipment documentation.
- Use only replacement parts that are designed for use with original equipment. Contact your Nordson representative for parts information and advice.

Action in the Event of a Malfunction

If a system or any equipment in a system malfunctions, shut off the system immediately and perform the following steps:

- Disconnect and lock out electrical power. Close pneumatic shutoff valves and relieve pressures.
- Identify the reason for the malfunction and correct it before restarting the equipment.

Disposal

Dispose of equipment and materials used in operation and servicing according to local codes.

2. Description

This manual covers the Model 01FL Cyclo-Kinetic (CK) Flat-Line Powder Coating Booth.

System Operation

See Figure 1.

The main components of the booth are an enclosure (24), conveyor module (17), collector module (2), and fan section (15). The conveyor module houses a conveyor, conveyor belt brush and housing (16), and motors (18, 20, 21). The collector module houses a separator (4) and cartridge filters (3). The fan section houses exhaust fans (12), fan motor (14), and a final filter (13). The conveyor module is mounted on tracks (19), allowing it to be moved off-line for cleaning and color change. Ductwork connects the conveyor brush housing and enclosure to the collector module.

The exhaust fan pulls spray-room air into the enclosure and conveyor brush housing, and through the ductwork, separator, and cartridge filters. The air returns to the spray room through the final filter. A variable frequency drive (VFD) controls exhaust fan speed.

Automatic powder spray guns (23) are mounted vertically over the conveyor. Powder pumps (9) mounted on a feed hopper (10) supply the spray guns with powder. The guns spray powder on the parts passing under them when triggered by a photosensor (22). The overspray is cleaned off the conveyor belt by a rotating brush. The air flowing through the enclosure and the brush housing carries the powder overspray into the separator. A transition conveyor transfers the parts to an oven conveyor.

The separator removes powder particles over 10 microns in size from the air flow by centrifugal force. A transfer pump (5) connected to the separator pumps the recovered powder to an accumulator (6). The powder is screened by a rotary sieve (7) and returned to the powder feed hopper. Powder clumps and other contaminants too large to pass through the sieve screen are ejected into the scrap container (11). The accumulator and feed hopper are vented into the collector module.

The cartridge filters remove the small amount of powder remaining in the air flow. The powder accumulates on the filter media, gradually restricting the air flow through the filters. A differential pressure gauge monitors the filter restriction. At a preset pressure differential, a pressure switch opens two pulse valves mounted below the cartridge filters. The pulse valves release large volumes of compressed air through the center of the filters, blowing the collected powder off the filters. The powder falls into a hopper in the bottom of the collector module. This powder is discarded, since it consists mainly of very fine particles that do not charge well.

The cleaned air flows past the exhaust fan and returns to the spray room through the final filter. The final filter ensures that no powder escapes from the fan section into the spray room. A pressure switch monitors the pressure differential between the interior of the fan section and the exterior. At 2-in. w.c., an alarm is triggered, warning the operator that the filters are starting to clog. At 3-in. w.c., the system will automatically shut down. The filter must be replaced and any powder leaks stopped before restarting the system.

An optional oscillator (1) can be installed in the system. The oscillator moves the spray guns in an repetitive pattern for better powder coverage.

Safety Features

A flame detector indicator/relay panel and deflagration vent are required for this system.

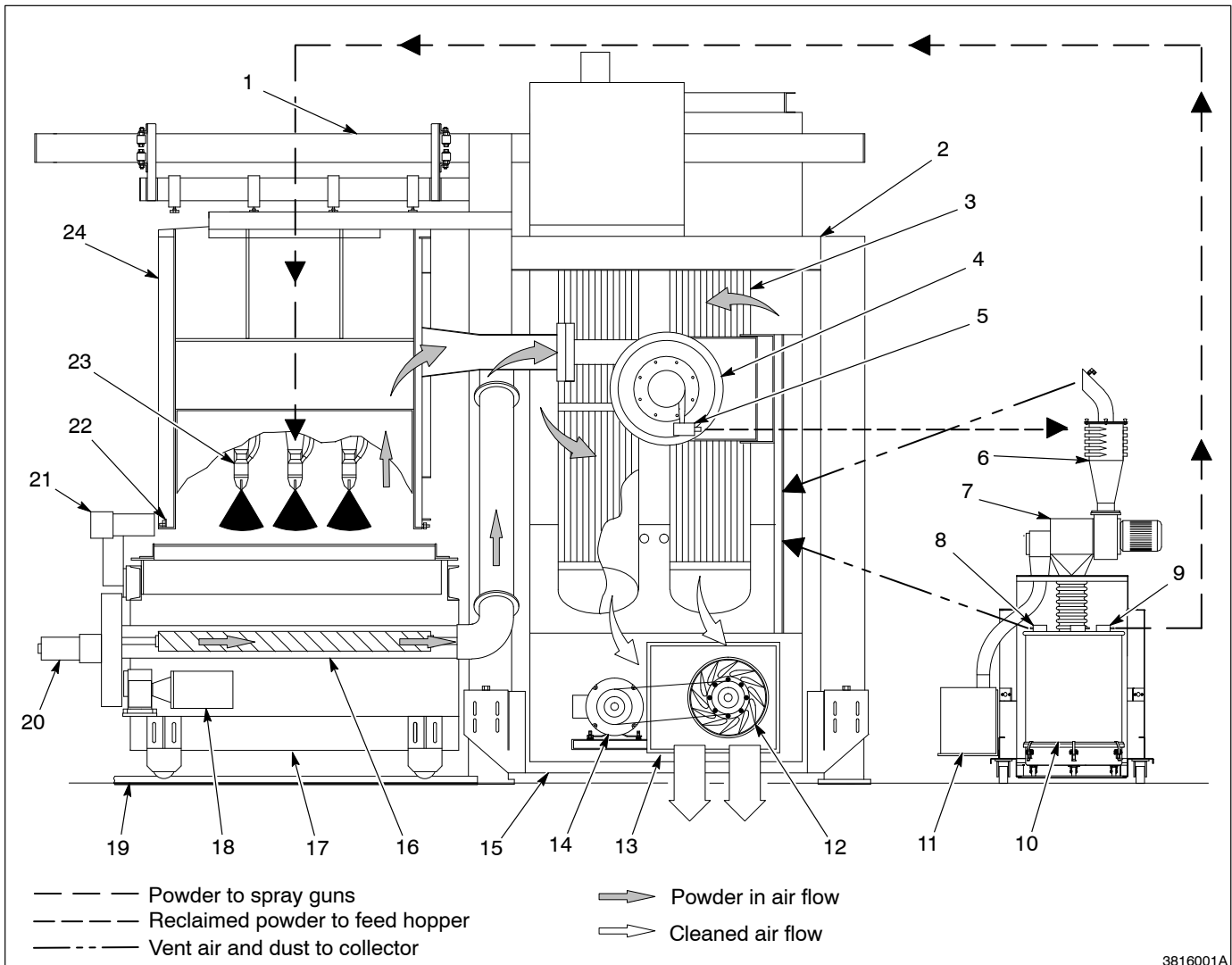
Flame Detector Indicator/Relay Panel

ANSI/NFPA standards 33 and 68 apply to this system. A quick-acting automatic flame detector indicator/relay panel, interlocked with the system controls, must be installed in the booth. The flame detector indicator/relay panel must shut down the powder application equipment, system air supply, and exhaust fans if it detects a spark or flame.

Deflagration Vent

To minimize damage and protect personnel, the top of the collector module is fitted with a deflagration vent. Ductwork must be installed from the vent to the exterior of the building. If a spark or flame is drawn into the collector module and ignites an explosion, the vent and ductwork will direct the force of the explosion outside the building.

System Operation Illustration



3816001A

Fig. 1 System Operation

- | | | |
|--------------------------|---------------------|-------------------------------|
| 1. Oscillator (optional) | 9. Powder pump | 17. Conveyor module |
| 2. Collector module | 10. Hopper | 18. Conveyor motor |
| 3. Cartridge filters | 11. Scrap container | 19. Roll-on/off tracks |
| 4. Separator | 12. Exhaust fan | 20. Brush motor |
| 5. Transfer pump | 13. Final filter | 21. Transition conveyor motor |
| 6. Accumulator | 14. Fan motor | 22. Photosensor |
| 7. Rotary sieve | 15. Fan section | 23. Powder spray gun |
| 8. Vent pump | 16. Brush housing | 24. Enclosure |

3. Operation

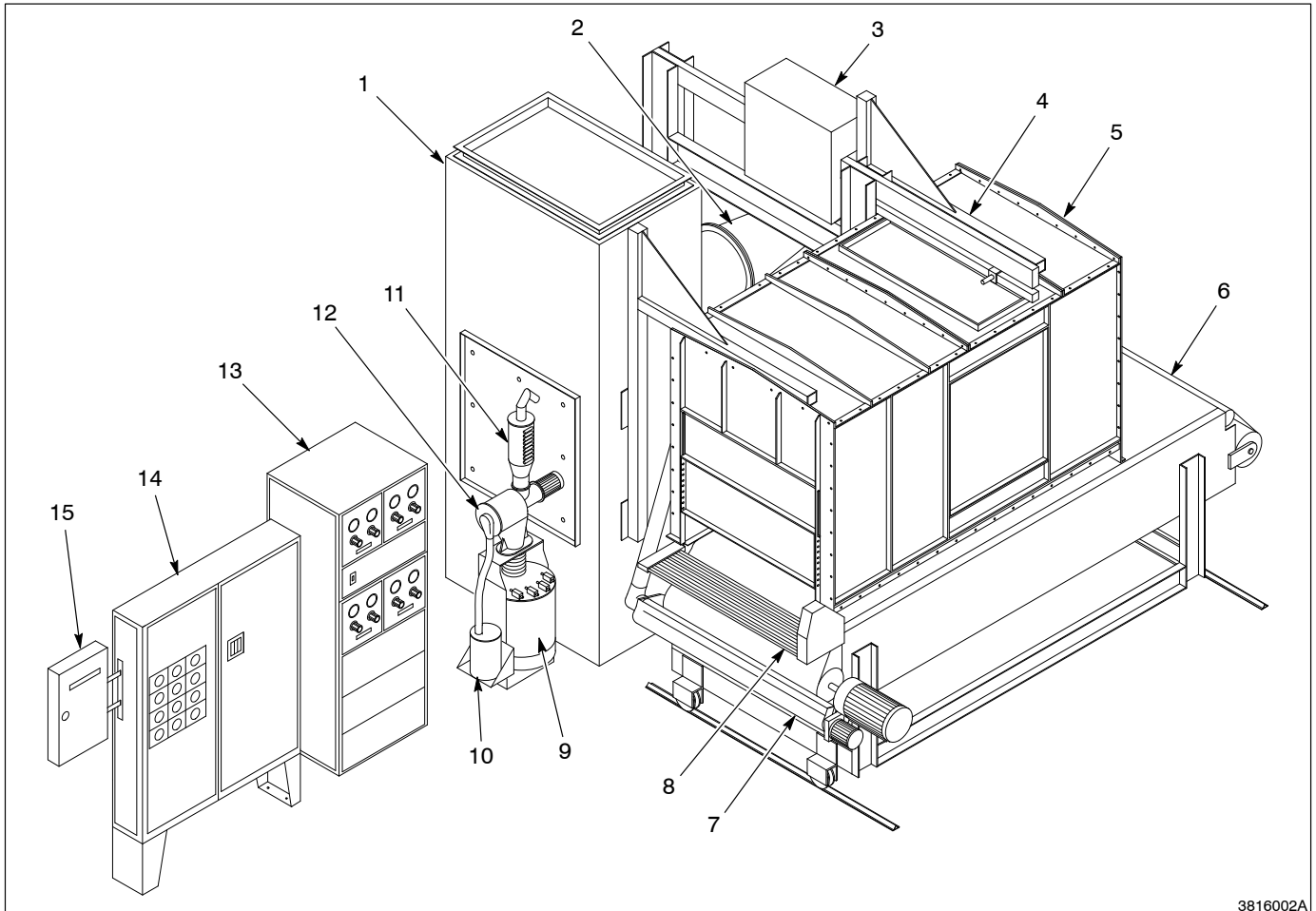


WARNING: Allow only qualified personnel to perform the following tasks. Observe and follow the safety instructions in this document and all other related documentation.

Operation procedures consist of initial system setup, daily startup, daily shutdown, and color change. Use the initial system setup procedure for new systems.

System Components

Figure 2 and Table 1 illustrate and describe the major system components.



3816002A

Fig. 2 System Components

- | | | |
|--------------------------|------------------------|--|
| 1. Collector module | 6. Conveyor | 11. Accumulator |
| 2. Separator | 7. Conveyor belt brush | 12. Rotary sieve |
| 3. Oscillator (optional) | 8. Transition conveyor | 13. Gun control cabinet |
| 4. Enclosure support | 9. Feed hopper | 14. System electrical panel |
| 5. Enclosure | 10. Scrap container | 15. Flame detector indicator/relay panel |

System Components (contd)

Table 1 System Components

Item	Equipment	Description
1	Collector module	Houses separator and cartridge filters, stores reclaimed powder.
2	Separator	Uses centrifugal force to remove powder from system air flow.
3	Oscillator	Moves the spray guns in a repetitive pattern (optional).
4	Enclosure supports	Suspends the enclosure over the conveyor.
5	Enclosure	Contains the sprayed powder within the system.
6	Conveyor	Transports the workpieces through the booth.
7	Conveyor belt brush	Cleans oversprayed powder off the conveyor belt.
8	Transition conveyor	Transfers coated parts to the oven conveyor.
9	Feed hopper	Stores and fluidizes powder supply for the spray guns.
10	Scrap container	Stores non-recyclable material ejected from the sieve.
11	Accumulator	Provides a connection point for multiple transfer hoses. Collects powder pumped from the separator to the feed hopper.
12	Rotary sieve	Screens powder pumped from the separator.
13	Gun control cabinet	Houses a master control unit, gun control units, pilot valve, and pneumatic manifold. The master control unit distributes power to the gun control units. The pilot valve and manifold distribute air to the gun control units.
14	System electrical panel	Houses system electrical controls, transformer, motor starters, overload protectors, and terminals blocks. Distributes conditioned power to the system devices.
15	Flame detector indicator/relay panel	Houses fire detection system controls. Remote sensors monitor the interior of the booth. If the sensors detect a spark or flame, the panel will shut down the powder coating system.

Initial System Setup

Use these procedures to prepare your powder booth for production. Setup and operation of powder application equipment, gun movers, and advanced control systems, such as the Smart-Coat system, are covered in separate manuals.

Use the charts at the end of this section to record your booth and spray gun settings. Make extra copies of the charts as needed.



WARNING: Even with the electrical-panel disconnect switch in the off position, the terminals at the top of the switch are still live. Do not touch them. Failure to observe this warning could result in serious injury or death.

See Figure 2.

1. Disconnect the system electrical power at the system electrical panel (14) and open the panel door.
2. Set the pulse valve timers.

Pulse valve off timer:	90 seconds
Pulse valve on timer:	0.07 seconds
3. Close the panel door and turn on electrical power.
4. Set all system air pressure regulators to zero.
5. Turn on the system compressed air supply. Adjust the system air pressure to 6.2 bar (90 psi).
6. Set the separator transfer-pump pressure to 1.4 bar (20 psi).
7. Fill the feed hopper (9), $\frac{2}{3}$ full of powder.
8. Calibrate the feed-hopper level sensor. Refer to *Feed Hopper Level Sensor Calibration* in this section.
9. Set the feed-hopper fluidizing air pressure to 0.7–1 bar (10–15 psi). Adjust the pressure until you see the powder gently boiling. Allow 10–15 minutes for the powder to fluidize before spraying.

Initial System Setup (contd)

10. Start the exhaust fan. This will also start the separator transfer pumps and the rotary sieve (12).

11. See Figure 3.

Sieve air controls are located on the sieve. Set the bearing air pressure regulator (3) and flowmeters (1):

Bearing air pressure: 1.7 bar (25 psi)
 Flowmeters: 2.8 m³/h (100 SCFH)

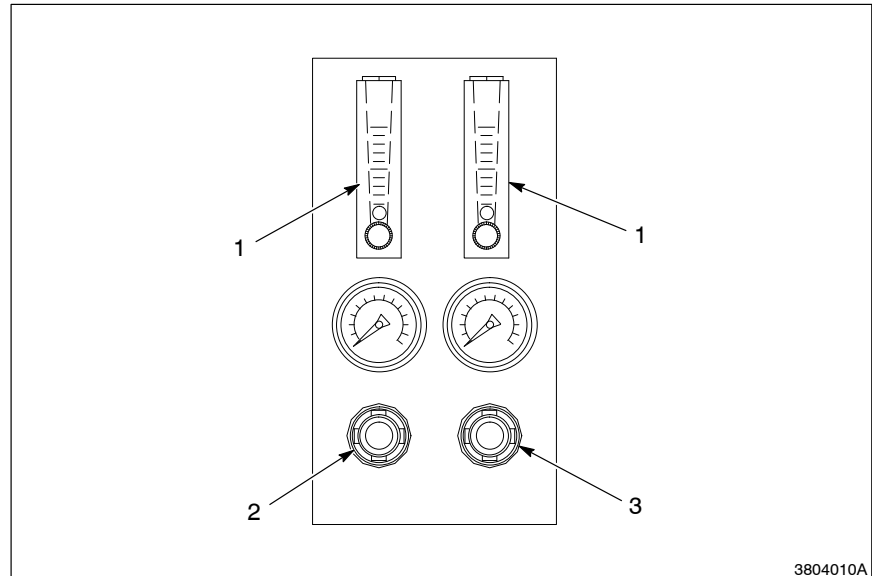


Fig. 3 Sieve Air Controls

- 1. Flowmeters
- 2. Vent-assist air pressure regulator
- 3. Bearing air pressure regulator

12. Set the accumulator vent-assist air pressure regulator (2). Refer to *Accumulator Vent-Assist Air Pressure Adjustment* in this section.

NOTE: See Figure 13.

The regulator is part of the air volume control inside the collector housing.

13. Adjust the pulse-valve air pressure to 3.5–4.1 bar (50–60 psi). Cartridge filter pulsing will not start until triggered by the pressure switch in the collector module.

14. Adjust the fan speed control to obtain the proper air flow through all enclosure openings. ANSI/NFPA-33 requires a minimum of 30–37 m/min (100–120 fpm).
15. Set the conveyor interlock switch to NORM.



WARNING: An ungrounded or poorly grounded workpiece, hanger, or conveyor can cause electrical arcing. If arcing is observed, shut down the system immediately. Correct the cause before resuming operations. Failure to observe this warning could result in a fire or explosion, causing property damage and possible personal injury or death.

16. Start spraying powder.
17. See Figure 2, (13).

Adjust the gun control unit settings to obtain the coverage and film thickness desired.

Feed-Hopper Level Sensor Calibration

The level sensor is a capacitive proximity switch. New switches must be configured and calibrated.

NOTE: Replacement sensors are shipped configured as normally closed (N.C.) switches.

1. See Figure 4.

If the switch is new, remove the black cover from the end and cut the bridge jumper (5). This will make the switch normally closed (N.C.).

2. Insert the level sensor into the plastic mounting well (1) in the side of the feed hopper until it bottoms out, then tighten the plastic screws on the side of the well to hold the sensor securely.
3. Make sure system power is on and the exhaust fan is running.
4. Open the feed hopper lid, and fill the hopper $\frac{2}{3}$ full of powder.
5. Increase the hopper fluidizing air pressure to 0.7–1 bar (10–15 psi). Add powder if the level does not rise above the top of the sensor mounting well.
6. Shut off the fluidizing air. The sensor mounting well should be coated with a film of powder.

Feed-Hopper Level Sensor Calibration (contd)

7. If the sensor LED (3) is on, slowly turn the sensor potentiometer (2) clockwise until it goes off. If the LED is off, slowly turn the potentiometer counterclockwise until it lights, then clockwise until it goes off.
8. Increase the fluidizing pressure until the powder level rises above the mounting well. The LED should be off.
9. Turn the potentiometer counterclockwise, counting the number of turns you make, until the LED lights.
10. Turn the potentiometer clockwise for $\frac{1}{2}$ the number of turns you counted in step 8. The LED will go off. The sensor is now set in the midpoint of its sensitivity range.

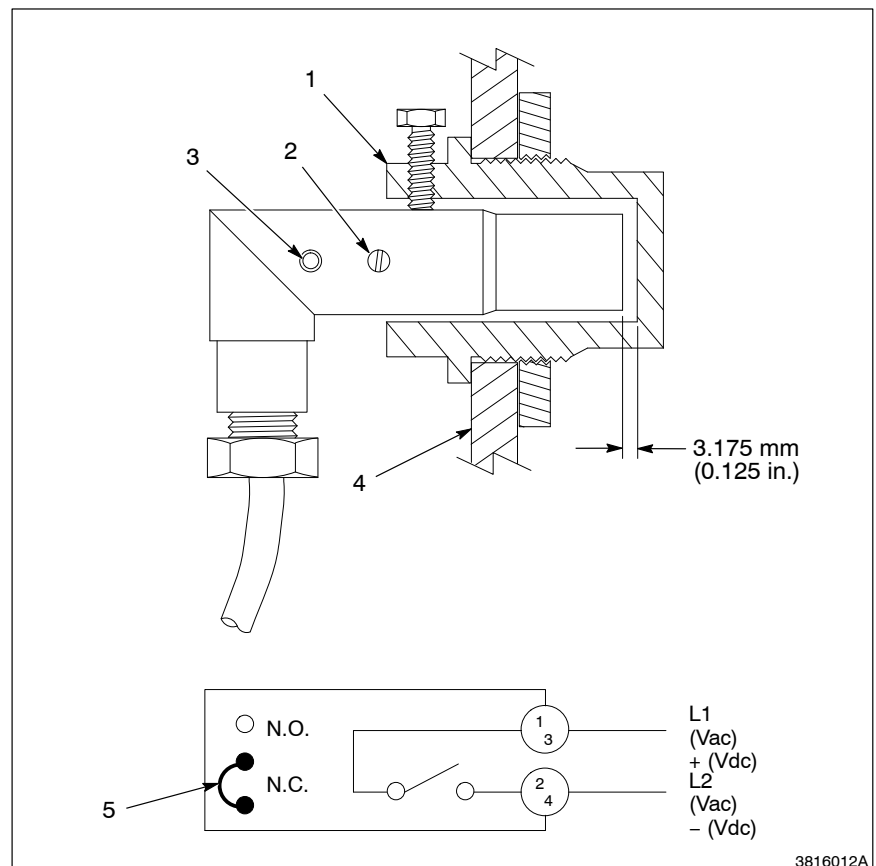


Fig. 4 Level Sensor Installation and Configuration

- | | |
|------------------|------------------|
| 1. Mounting well | 4. Hopper wall |
| 2. Potentiometer | 5. Bridge jumper |
| 3. LED | |

Vent-Assist Air Pressure Adjustment

To maintain a neutral air pressure in the sieve, the compressed air used to convey the reclaimed powder to the accumulator is vented into the booth. Vent-assist air creates low pressure in the vent tube and increases the air flow. Use the following procedure to adjust the vent-assist air pressure.

NOTE: The vent-assist air pressure regulator is located either on the sieve pneumatic panel, or on the system pneumatic panel.

1. Disconnect the scrap hose from the sieve.
2. Secure a paper or plastic bag to the scrap port with a worm clamp, cable tie, or rubber band.
3. Start the exhaust fan, sieve, and transfer pumps.
4. Watch the bag. If it inflates, increase the vent-assist air pressure. If it deflates, decrease the vent-assist air pressure.

Daily Startup

1. Turn on the system electrical power and compressed air supply.
2. Walk around the booth and verify that the
 - system equipment is connected to ground
 - flame detector indicator/relay panel is on
 - transfer and feed hoses are connected to the pumps, accumulator, and guns
 - feed hopper has an adequate supply of powder for production (no more than $\frac{2}{3}$ full)
3. Turn on the exhaust fan. Set the conveyor switch to NORM.
4. Turn on the master control unit in the gun control cabinet. Turn on the gun control units if they are off.

Daily Startup (contd)

5. Adjust the kV settings and the powder-pump air pressures, if necessary. Refer to your spray gun and control unit manuals.



WARNING: An ungrounded or poorly grounded workpiece, hanger, or conveyor can cause electrical arcing. If arcing is observed, shut down the system immediately. Correct the cause before resuming operations. Failure to observe this warning could result in a fire or explosion, causing property damage and possible personal injury or death.

6. Start the conveyor and start spraying workpieces.
7. Check the air flow through the enclosure. If the velocity is too high, the sprayed powder will be pulled away from the workpieces. If the velocity is too low, the powder will escape from the enclosure. Adjust the fan speed at the Variable Frequency Drive (VFD) as needed. Maintain a minimum air flow through each opening of 30 m/min (100 fpm).

Daily Shutdown

1. Turn off the master control unit in the gun control cabinet.
2. Perform the daily maintenance procedures described in the *Maintenance* section.
3. Turn off the exhaust fan. Shut off the system electrical power and compressed air supply.

Color Change

NOTE: If you supply the feed hopper with new powder from a box feeder or other bulk feed system, shut it down an hour before completing production and changing colors. This will reduce the amount of powder left in the feed hopper.



WARNING: Wear an approved respirator and safety glasses or goggles when performing maintenance or cleaning operations. Follow the personal protection recommendations included in the Material Safety Data Sheets for each powder used.

1. Run the exhaust fan at normal operating speed.
2. Attach the vent hose from the scrap container to the vent stub on the collector module wall.
3. Shut off the air to the separator transfer pump.
4. Disconnect the transfer pump hose from the sieve accumulator and connect it to a scrap container.
5. Turn on the air to the separator transfer pump. Set the pressure to 2 bar (30 psi).
6. Clean the spray guns, powder pumps, and feed hoses, interior walls, ceiling, and floor of the enclosure, and the conveyor belt and brush.
7. Replace the powder feed hoses with ones previously used with the new powder or with new hoses.
8. Turn off the booth exhaust fan.



WARNING: Starting the exhaust fan starts the sieve. Never work on the sieve while it is running. Failure to observe this warning could result in serious personal injury.

9. Clean the accumulator and sieve with a vacuum and soft brush. Clean the feed hopper or replace it with one containing the new powder.
10. Turn the booth exhaust fan on. Clean up the booth exterior, if necessary.
11. Shut off the air to the separator transfer pump. Remove and clean the transfer pump. Clean the transfer hose, or replace it with one previously used with the new powder.

Color Change (contd)

12. Remove the remaining powder residue from the enclosure with an air-powered vacuum and a soft brush attachment. Wipe down all surfaces with a damp, lint-free cloth (do not use tack cloths).
13. Slow the exhaust fan to half speed (set the VFD to 30 Hz).



CAUTION: Running the fan at less than half speed for extended periods may shorten the motor life.

14. Open the separator and clean the interior, including the perforated thimble in the center.
15. Reconnect the transfer pump, transfer hose, and vent hose.

4. Maintenance



WARNING: Allow only qualified personnel to perform the following tasks. Observe and follow the safety instructions in this document and all other related documentation.



WARNING: Wear an approved respirator and safety glasses or goggles when performing maintenance or cleaning operations. Follow the personal protection recommendations included in the Material Safety Data Sheets for each powder used.

Perform these procedures to keep your system clean and functioning properly.

Daily Cleaning

1. Turn off the master-control unit in the gun control cabinet.
2. Turn on the exhaust fan and set the VFD to cleanup mode.
3. Disconnect the powder-feed hoses from the powder pumps. Blow the powder out of the hoses and guns with compressed air.
4. Ground the gun electrodes and clean the guns according to the instructions in the gun manuals.
5. Disconnect the separator transfer pump from the separator. Blow out the pump and transfer hose with compressed air.

6. Clean the enclosure roof, walls, and conveyor belt with a rubber squeegee.
7. If changing colors, roll the conveyor module off-line so you can access the conveyor brush and housing.
8. Remove the remaining powder residue from the enclosure and conveyor brush housing with an air-powered vacuum and a soft brush attachment. Wipe down all surfaces with a damp, lint-free cloth.
9. Disconnect the duct from the conveyor brush housing. Wipe out the duct and brush housing with a damp, lint-free cloth.
10. Slow the exhaust fan to half speed by setting the VFD to 30 Hz.



CAUTION: Do not run the fan at less than half speed for extended periods. This may shorten the motor life.

11. Open the separator and clean the interior.
12. Turn off the exhaust fan.

Daily Maintenance

Perform these tasks daily.

Air Velocity

Measure the air velocity at all enclosure openings with a velometer. Minimum velocity is 30 m/min (100 fpm).

Filters

1. Check the final-filter differential pressure gauge. It should read less than 2-in. w.c. If the gauge reads between 2- and 3-in. w.c., check for powder leaks around the cartridge filter gaskets or for damage to the filter media. Make sure no powder is leaking from around the final filter gaskets or through the media.
2. Check the cartridge-filter differential pressure gauge. It should read between 4- and 6-in. w.c. Check the pulse valve timing.

Rotary Sieve

1. Shut off the exhaust fan.
2. Empty the scrap pail.
3. Open the sieve housing and clean the rotor and screen with a soft brush. Replace the screen if it is damaged.
4. Check the bearing air pressure and flow rate. Check the vent-assist air pressure. Refer to your sieve manual for more information.

Transfer Pumps

1. Remove the transfer pump from the separator. Blow out the pump with compressed air.
2. Disconnect the transfer hose from the pump. Blow out the hose with compressed air.
3. Disassemble the pump. Clean the parts with a low-pressure air gun and a clean cloth. Replace any worn or damaged parts.

Powder Guns

Disassemble and clean the guns according to the instructions in their manuals.

Powder Pumps

Disassemble and clean the pumps according to the instructions in their manuals. Replace worn parts.

Flame Detector Indicator/Relay Panel

Check the detector sensors every four hours and clean the lenses, if necessary. Make sure air is being supplied to the sensors. Make sure the detector system is operating properly.

Compressed Air Supply

Hold a clean, white cloth under the drop leg in the system air-supply line. Slowly open the drop-leg drain valve. Water, oil, or other contaminants in the air will stain the cloth. Eliminate any source of contamination. Drain the air filters and separators and check the filter elements. Check all air pressure regulator settings.

NOTE: The air dryer should remain on at all times to prevent moisture from accumulating in the compressed air system.

Air Dryers

Refer to your air dryer manual for maintenance procedures and schedules.

Gun Movers (Oscillators and Reciprocators)

Each shift, make sure the gun movers are stroking smoothly and at the proper speed. Make repairs and adjustments if necessary. Lubricate the gun movers as described in their manuals.

Sieve Accumulator and Vent Hose

Vacuum out the accumulator and blow the powder out of the vent hose with compressed air.

Workpiece and Conveyor Grounds



WARNING: An ungrounded or poorly grounded workpiece, hanger, or conveyor can cause electrical arcing. If arcing is observed, shut down the system immediately. Correct the cause before resuming operations. Failure to observe this warning could result in a fire or explosion, causing property damage and possible personal injury or death.

Make sure all workpieces are grounded. The resistance between the workpieces and ground must be less than 1 megohm. Use a megohm meter to check resistances. You will get better transfer efficiency and workpiece coverage at 500 ohms or less.

Weekly Maintenance

Perform these tasks weekly.

Enclosure

Turn on the exhaust fan and vacuum the enclosure roof, walls, and floor with a soft brush attachment. Wipe down the enclosure with damp, lint-free cloths. Clean the booth exterior, all attached equipment, and the spray room.

Check the panels for cracks, damage, and dirt. Clean dirt and powder from the exterior. Seal any cracks or replace the panels. Make sure the enclosure supports are secure.

Collector Module

CAUTION: Do not run the fan at less than half speed for extended periods. This may shorten the motor life.

Open the access door and check the level of scrap powder in the bottom. If the level is close to the bottom of the cartridge filters, slow the exhaust fan to half speed by setting the VFD to 30 Hz, then remove the powder in the collector module. Do not let the powder level rise above the bottom of the filters.

Fan Compartment

Remove the final filter and inspect the fan compartment. Vacuum out any powder. If significant amounts of powder have accumulated in the fan compartment, the cartridge filters may be leaking. Refer to *Troubleshooting* for instructions.

Cartridge Filters

If you found significant amounts of powder in the fan compartment, inspect the cartridge filter media and gaskets. Do not vacuum the cartridge filters. If you find powder inside the cartridges, the filter media or gasket is damaged and leaking. If the filter media is contaminated with oil or water, check the air filter, separator, and dryer. Replace the filters if they are leaking or contaminated.

Transfer Pump

Disassemble the pump. Clean the parts with a low-pressure air gun and a clean cloth. Replace any worn or damaged parts. Blow out the transfer hose with compressed air. Replace the hose if it is damaged or clogged.

Powder Guns and Cables

Clean the guns. Perform electrostatic resistance checks and continuity checks as described in the gun and gun control unit manuals.

Powder Pumps and Feed Hoses

Disassemble the pumps and clean them according to the instructions in their manuals. Replace any worn or damaged parts. Blow out the feed hoses with compressed air. Replace damaged or clogged hoses.

Feed Hopper

Remove the powder from the hopper. Vacuum the interior. Check the fluidizing plate. If the plate is stained, the air supply could be contaminated by oil or moisture. Replace the fluidizing plate if it is contaminated and check the air filter, separator, and dryer.

Air Knife Blower (Optional Equipment)

Inspect and clean the air intake screen.

Periodic Maintenance

Perform these tasks periodically.

Electrical Connections

Check all terminal blocks and junction boxes for loose wires. Tighten any loose connections and inspect the system wiring. Replace any wires with damaged insulation.

Spray Guns

Perform electrostatic resistance checks as described in the gun manuals.

Air Dryer

Check the air dryer operation. Refer to your air dryer manual for maintenance procedures and schedules.

Gaskets

Inspect all gaskets and seals for damage. Replace them if they are damaged.

Exhaust Fan V-belts

Check the V-belts monthly. Replace cracked or worn belts. Check the belt tension. You should not be able to deflect the belts more than 13–19 mm (0.50–0.75 in.) (one belt diameter).

Bearings

Every 80 to 112 hours of operation, lubricate each fan shaft bearing with 4.2 grams (0.15 oz) of No. 2 lithium grease. Grease fittings are on the front of the fan section, between the final filters.

Every six months, lubricate the motor bearings with 4.2 grams (0.15 oz) of No. 2 lithium grease.

Rotary Sieves

AZO sieves: Every three months, lubricate the lip seals with a white lithium grease as described in your AZO sieve manuals.

Nordson sieves: Refer to your sieve manual for instructions.

Differential Pressure Gauges

Record the differential pressure gauge readings.

If the pressure drop across the cartridge filters exceeds 6-in. w.c., the filters are clogged. If the pressure drop across the final filters exceeds 3-in. w.c., the system will shut down.

Powder Feed and Transfer Hoses

Disconnect the hoses from the pumps. Blow the powder out of the hoses with compressed air. Never blow air through the hoses toward the pumps. Replace the hoses if they are clogged with impact-fused powder.

Wheels and Casters

Lubricate the conveyor module wheel bearings with two shots of white lithium grease from a grease gun every six months.

Maintenance Check List

Copy this list and post it near your system for reference.

Activity	Each Shift	Daily	Weekly	Monthly	Color Change
Cleaning					
Accumulator		√			
Conveyor belt brush	√				
Enclosure		√	√		√
Fan section			√		
Feed and transfer hoses	√				√
Flame detector indicator/ relay panel*	√				√
Guns	√		√		√
Powder pumps	√	√	√		√
Rotary sieve	√	√			√
Spray gun resistance checks			√		
Transfer pump	√	√			√
Vent hose		√			√
Visual Checks					
Air supply line drop leg		√			
Air dryer drain		√			
Collector module powder level			√		
Differential-pressure gauges	√				
Electrical connections			√		
Exhaust fan V-belts				√	
Feed hopper powder level	√				
Fire detector sensors	√				√
Gaskets			√		√
Gun mover	√				
Workpiece clearance**	√				
Workpiece grounding	√				√

* Every 4 hours.

** Clearances should be monitored continuously.

Lubrication	Every 80–112 hrs	Every 3 months	Every 6 months
Fan shaft bearings (two shots, No. 2 lithium grease)	√		
AZO rotary-sieve lip seals (wipe with lithium grease)		√	
Motor bearings (two shots, No. 2 lithium grease)			√
Conveyor module wheel bearings (two shots, No. 2 lithium grease)			√

5. Troubleshooting



WARNING: Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.

This section contains troubleshooting procedures. These procedures cover only the most common problems that you may encounter. If you cannot solve the problem with the information given here, contact your local Nordson representative for help.

Problem		Page
1.	Guns are surging or spitting; powder flow is inadequate or intermittent	26
2.	Problems with coating uniformity, edge coverage, film build, wrap, or penetration into recesses	27
3.	Powder not transferring from separator to feed hopper	28
4.	Powder in feed hopper not fluidizing, or clouds of powder erupting from surface	29
5.	Final filter clogged; powder in fan compartment	30
6.	Cartridge filters clogged	30
7.	System shuts down or will not start	31
8.	Sieve not screening powder	31
9.	Sieve scrap container filling up with powder	31
10.	Powder escaping from booth openings	32
11.	Brush not cleaning conveyor belt properly	32

Troubleshooting Chart

Problem	Possible Cause	Corrective Action
1. Guns are surging or spitting; powder flow is inadequate or intermittent	Powder in feed hopper inadequately fluidized	Adjust the fluidizing air pressure. The powder should be gently boiling. Refer to problem 4.
	Low powder level in feed hopper	Add powder to the feed hopper. Refer to problem 3.
	Powder pump venturi nozzles or throats worn; adapter O-rings leaking; pump or pickup tube clogged	Clean the pump and pickup tube. Replace any worn parts. Replace the adapter O-rings, if they are damaged.
	Obstruction in powder feed hose	Disconnect the feed hose from the pump. Blow the powder out of the hose with compressed air. Make sure the hose is clear. Eliminate kinks or severe bends in hose. Hose should be no longer than 7.6 m (25 ft) with a maximum 2.7 m (9 ft) vertical rise.
	Severe tribo-charging in powder feed hose	Contact your Nordson Corporation representative for a suitable hose material. Contact your powder supplier.
	Obstruction in gun	Clean the gun. If you are using conical nozzles, make sure there is a 3.175 mm (0.125 in.) or larger gap between the deflector and the nozzle.
	Flow-rate or atomizing air pressure incorrect	Refer to the gun and control unit manuals for recommended air pressures and ratios.

Continued on next page

Problem	Possible Cause	Corrective Action
2. Problems with coating uniformity, edge coverage, film build, wrap, or penetration into recesses	Poor workpiece grounding	Resistance from workpiece to ground must be less than 1 megohm. For best results, resistance should not be more than 500 ohms.
	Gun placement incorrect	Position the guns 25.4–35.5 cm (10–14 in.) from the workpieces. Stagger the guns 30.5 cm (12 in.) apart vertically and 38.1 cm (15 in.) apart horizontally to avoid fan pattern and electrostatic field overlap. Contact your Nordson Corporation representative for advice.
	Powder being pulled away from workpieces by high air flow or incorrect placement of guns	Slow fan to decrease air flow through booth. Do not decrease air flow to less than 30 m/min (100 fpm) If guns are too close to separator inlet, move guns or consult your Nordson Corporation representative.
	Powder pump flow-rate and atomizing air pressure incorrect	Refer to the gun and control unit manuals for the recommended air pressures and ratios.
	Electrostatic voltage (kV) or AFC setting incorrect for workpieces being coated	Adjust the voltage to 90–100 kV for large flat surfaces and 60–75 kV for recesses. Never set the voltage below 60 kV. Refer to the gun and control unit manuals for the recommended voltage, AFC, and air pressure settings and ratios.
	Wrong nozzles being used	Use flat spray nozzles for large, regular-shaped workpieces. Use conical nozzles for deep recesses and most manual touch-up.
	Powder feed problems	Refer to problem 1.

Continued on next page

Troubleshooting Chart (contd)

Problem	Possible Cause	Corrective Action
3. Powder not transferring from separator to feed hopper	Transfer pump air pressure too low	Increase the air pressure to 1.4 bar (20 psi).
	Transfer pump venturi nozzle clogged or throat worn	Clean the pump and replace worn parts.
	Transfer hose plugged	Blow the powder out of the hose with compressed air.
	Transfer pump inlet clogged	Remove the transfer pump and clean the inlet.
	Sieve screen clogged, or motor running in wrong direction	Clean the sieve screen. Refer to the <i>Reversing Motor Direction</i> procedure in this section.
	Accumulator plugged	Clean out the inlet ports. Clean the accumulator interior.
	Accumulator vent-assist air pressure too high	Reduce the vent-assist air pressure.
	Solenoid valve failed	Check the transfer pump solenoid valve.
<i>Continued on next page</i>		

Problem	Possible Cause	Corrective Action
4. Powder in feed hopper not fluidizing, or clouds of powder erupting from surface	Fluidizing pressure too low or too high	Check the powder in the hopper. Increase the fluidizing air pressure until the powder is gently boiling. Decrease the pressure if clouds of powder are erupting from the surface.
	Moist or oil-contaminated powder	Open the drain valve at the air-supply drop leg and check the air supply for water or oil. Check the filters, separators, and air dryer. Replace the powder in the hoppers. Refer to the next cause.
	Air leaking from fluidizing drum gasket instead of diffusing through fluidizing plate, or contaminated air plugging pores in fluidizing plates	Check for air leaks around the fluidizing drum gasket. If you find leaks, remove the drum and replace the gasket. If fluidizing air pressure increases or decreases abruptly, remove the powder from the hopper and inspect the fluidizing plate for stains, discoloration, or polished surface. Replace the fluidizing plate if it is contaminated or plugged.
	Fluidizing plate is cracked	Check the fluidizing plate, and replace it if it is cracked.
	Incorrect ratio of reclaimed-to-new powder	Increase or decrease the air pressure to the bulk feeder transfer-pump change the transfer rate. Add new powder to hopper. The powder supply should be no more than 3 parts reclaim-to-1 part new powder.
	Uneven distribution of powder in hopper	Increase the fluidizing pressure. Check the powder and the fluidizing plate for contamination as previously described.

Continued on next page

Troubleshooting Chart (contd)

Problem	Possible Cause	Corrective Action
5. Final filter clogged; powder in fan compartment	Cartridge gaskets not compressed enough to form a good seal, or gaskets are leaking, or filter media is damaged	<p>Make sure the cartridge filter gaskets are sealing correctly. If you can slip a 0.4 mm (0.015 in.) feeler gauge between the gasket and the sealing surface, the gaskets are not compressed enough to make a good seal. Tighten the crank handles to compress the gaskets.</p> <p>If the gaskets continue to leak, remove the cartridges. Clean and inspect the gaskets, sealing surfaces, and filter media. Replace the cartridges if the gaskets or filter media are damaged. Refer to the <i>Repair</i> section. Replace clogged final filters.</p>
6. Cartridge filters clogged	<p>Pulse air pressure inadequate</p> <p>Powder contaminated</p> <p>Pulse valves out of position</p> <p>Timer board settings incorrect</p> <p>Pulse valves or solenoid valves clogged or malfunctioning</p> <p>Collector module powder level too high</p>	<p>Increase the pulse air pressure or volume. Decrease the pulse timer delay (off time).</p> <p>Replace contaminated powder and fix the source of contamination.</p> <p>Position the valves as described in the <i>Repair</i> section.</p> <p>Adjust the timer board settings as described in the <i>Operation</i> section.</p> <p>Open the motor timer panel. If you do not hear a pulse each time a LED on the panel lights, the solenoid valve or the pulse valve connected to that LED may be clogged or failed. Check the wiring to the solenoid valve before opening the solenoid box and replacing the solenoid valve.</p> <p>Powder level must not be higher than bottom of cartridges. Remove powder module.</p>

Continued on next page

Problem	Possible Cause	Corrective Action
7. System shuts down or will not start	<p>Flame detectors have detected a flame or spark, or are malfunctioning</p> <p>Final filter clogged</p> <p>Final filter pressure switch failed</p> <p>Air dryer not operating, or interlock not activated</p> <p>Fuse blown</p> <p>Electrical failure</p>	<p>Check the inside of the enclosure and conveyor module. Check grounds. Make sure flame detectors are aimed correctly.</p> <p>Follow the troubleshooting procedures in the flame detector indicator/relay panel manual.</p> <p>Locate the source of powder leakage and correct the problem. Refer to problem 5.</p> <p>Adjust the setting or replace the switch.</p> <p>Start the air dryer. Follow the troubleshooting procedures in the dryer manual. Check the interlock circuit.</p> <p>Correct the electrical problem and replace the fuses.</p> <p>Trace the circuits and correct the problem.</p>
8. Sieve not screening powder	Screen clogged or damaged	Clean or replace the screen.
9. Sieve scrap container filling up with powder	<p>Scrap container lid not sealed</p> <p>Screen clogged</p> <p>Hopper or accumulator vent clogged or vent hose kinked</p> <p>Vent-assist air pressure too low</p>	<p>Lid must be airtight. Tighten the lid. Check the scrap hose connections.</p> <p>Clean or replace the screen.</p> <p>Clean the vents, and check the hoses.</p> <p>Increase the vent-assist air pressure. Refer to <i>Vent-Assist Air Pressure Adjustment</i> in the <i>Operation</i> section.</p>

Continued on next page

Troubleshooting Chart (contd)

Problem	Possible Cause	Corrective Action
10. Powder escaping from booth openings	<p>Cartridge filters clogged</p> <p>Cross drafts interfering with exhaust fan draw</p> <p>Fan speed too slow</p> <p>Workpieces entering booth are too hot</p> <p>Powder gun output exceeds booth containment capability</p> <p>Booth openings too large</p> <p>Workpieces too large for booth</p> <p>Guns too close to entrance and exit vestibules or openings</p> <p>Fan rotation backward</p>	<p>If the differential pressure gauge shows more than 6-in. w.c., refer to problem 6.</p> <p>Check for cross drafts at all enclosure openings. Eliminate or divert drafts.</p> <p>Increase the fan speed.</p> <p>Cool the workpieces before moving them into the booth. The workpiece temperature should not exceed 49 °C (120 °F).</p> <p>Reduce the powder flow and/or the number of the guns.</p> <p>Close or decrease the size of the openings.</p> <p>Contact your Nordson Corporation representative.</p> <p>Move the guns farther away from the vestibules or openings.</p> <p>Reverse the rotation of the motor. Refer to the <i>Reversing Motor Direction</i> procedure in this section.</p>
11. Brush not cleaning conveyor belt properly	<p>Motor rotation backwards</p> <p>Brush is pressing into the conveyor belt too far</p> <p>Brush not pressing into the conveyor belt far enough</p>	<p>Brush should be rotating in the opposite direction as the conveyor belt. Refer to the <i>Reversing Motor Direction</i> procedure in this section.</p> <p>Brush bristles should be no more than 3.175 mm (0.125 in.) into the belt. Use the adjuster screws at both ends of the brush housing to adjust the brush.</p> <p>Brush bristles should be 3.175 mm (0.125 in.) into the belt. Use the adjuster screws at both ends of the brush housing to adjust the brush.</p>

Reversing Motor Direction

Improperly connecting the motor starters will cause motors to rotate in the wrong direction. Use the following procedure to correct motor rotation.



WARNING: Even with the electrical-panel disconnect switch in the off position, the terminals at the top of the switch are still live. Do not touch them. Failure to observe this warning could result in serious injury or death.

1. Shut off system electrical power at a disconnect switch ahead of the system electrical panel. Lock out and tag the switch.
2. Open the system electrical panel and reverse any two wires (L1, L2, or L3) connected to the appropriate motor starter. Close the electrical panel door.
3. Turn on electrical power. Start the motor and check the rotation direction.

6. Repair



WARNING: Allow only qualified personnel to perform the following tasks. Observe and follow the safety instructions in this document and all other related documentation.

Final Filter Replacement

1. Shut off the exhaust fan. Shut off electrical power at the system electrical panel. Lock and tag the disconnect switch.
2. See Figure 5.

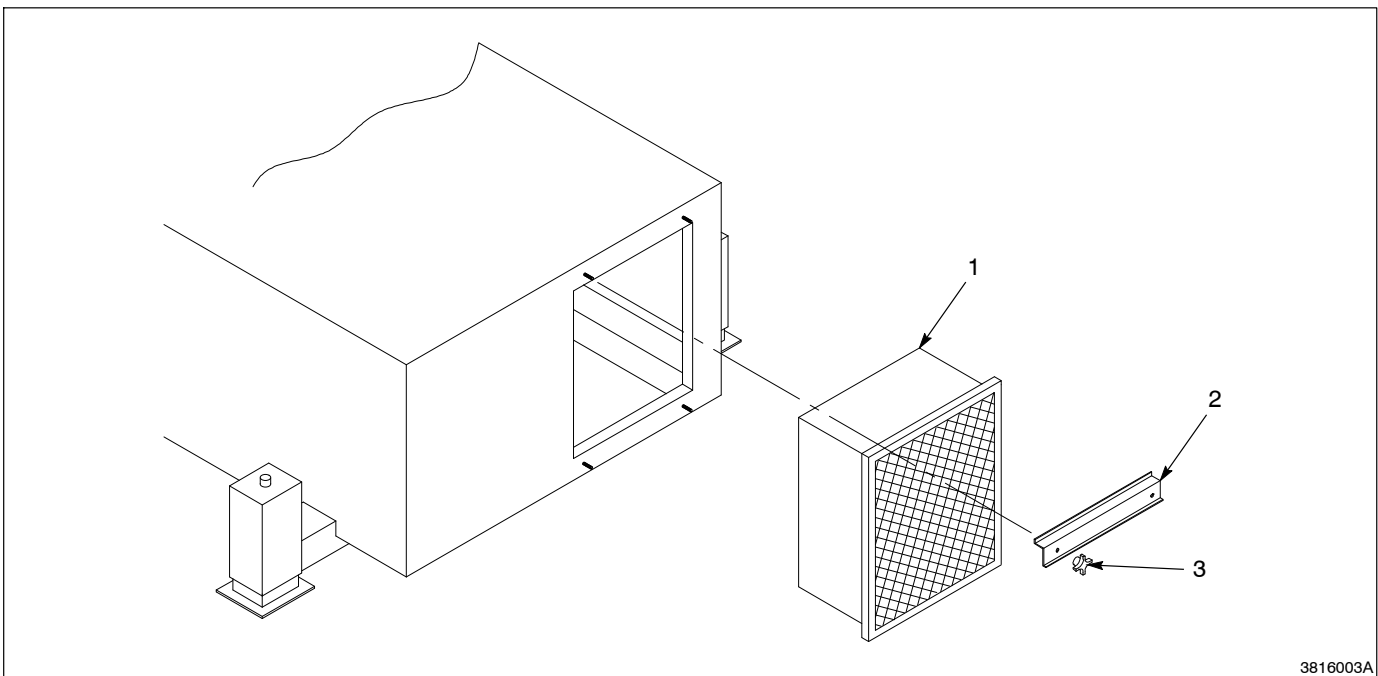
Unscrew and remove the threaded knobs (3) and brackets (2) securing the final filter (1) to the fan section.

3. Remove the old filter and discard it.
4. Check the interior of the fan section. If you see large amounts of powder inside the compartment, powder is leaking through the cartridge filter gaskets or media. Clean the fan section and fix the leak before starting the system.

Final Filter Replacement (contd)

NOTE: Do not use a damaged filter.

5. Remove the new filter from its carton. Inspect the filter housing, gasket, and media for damage.
6. Insert the new filter into the opening.
7. Install the brackets over the threaded studs. Thread the knobs onto the studs.
8. Tighten the knobs to compress the filter gasket slightly. Do not overtighten the knobs.
9. Restore system electrical power. Start the exhaust fan and check for leaks around the filter gasket.



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Fig. 5 Final Filter Replacement

1. Final filter

2. Brackets

3. Knobs

Cartridge Filter Replacement



WARNING: Wear an approved respirator or dust mask and safety glasses or goggles when handling powder or cleaning powder off equipment. Wear gloves if necessary to avoid getting powder on your skin. Wash with soap and water only.

1. Shut off system electrical power. Lock out and tag the disconnect switch.
2. See Figure 6.

Remove the access panel (3).

3. Turn the crank handle (4) on top of the cartridge filters (1, 2) until the push plate (5) is backed off enough to remove the filters.
4. Remove the cartridge filters. Note that closed end filter is on top.
5. Clean the push plate, and the sealing surfaces on the outlets.

NOTE: Do not use any cartridge filters other than those specified for your system. Using unapproved cartridge filters could seriously affect the operation and performance of your system, as well as void agency approvals. Do not use damaged filters.

6. Remove the new closed-end and open-end cartridge filters from the shipping boxes. Carefully inspect the new cartridge filters for
 - cuts or other damage to the gaskets
 - bent or dented end caps
 - holes or other damage to the filter media
7. Place the open-end cartridge filters on the outlets.
8. Place the closed-end cartridge filters on top of the open-end filters, with the closed end up.

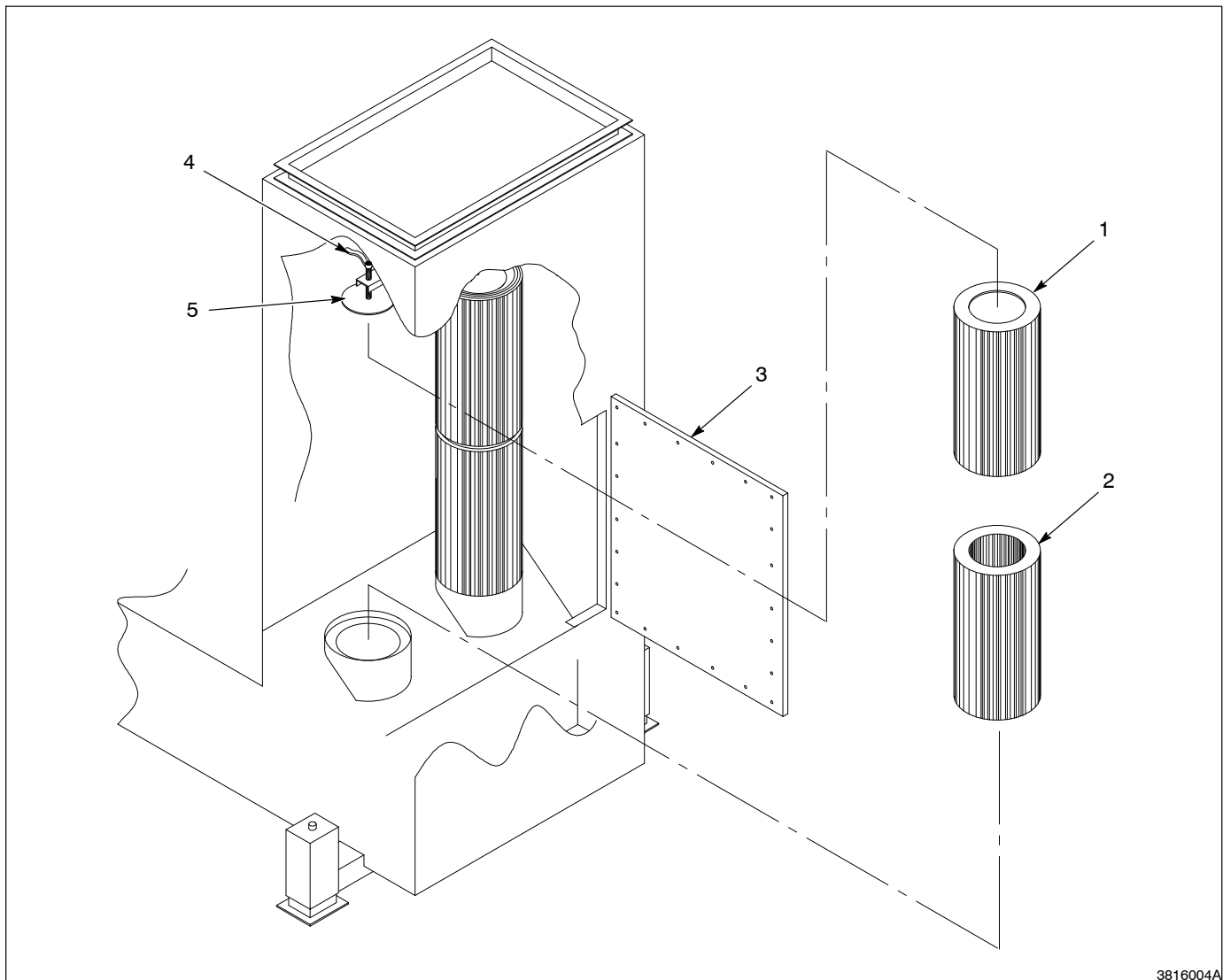
Cartridge Filter Replacement (contd)



CAUTION: Do not overtighten the crank handles, or you may damage the cartridge filters.

9. Tighten the crank handles to compress the cartridge gaskets to approximately 11 mm (0.438 in.) thick.

10. Replace the access panel and resume operations.



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Fig. 6 Cartridge Filter Replacement

1. Closed-end cartridge filter
2. Open-ended cartridge filter

3. Access panel
4. Crank handle

5. Push plate

Pulse Valve Replacement



WARNING: Before performing the following procedure, shut off the system compressed-air supply and relieve the system air pressure. Shut off electrical power at the system electrical panel. Lock and tag the disconnect switch.

1. See Figure 7.

Remove the access panel (1).

2. Disconnect the pilot air tubing (2) from the tube fitting (4).
3. Remove the extension tube (6) from the pulse valve (5). You do not need to remove the coupling (7) or nozzle (8) from the tube unless you are replacing them.
4. Remove the pulse valve from the manifold nipple (3).
5. Remove the tube fitting from the old valve.

NOTE: Seal all threaded connections with PTFE tape. Do not use a liquid or paste sealant.

6. Install the tube fittings on the new valves.
7. Install the valve on the manifold nipple. Position the valve so the final adjustment will tighten the threads and form an air-tight seal.
8. Install the extension tube on the valve.
9. Adjust the valve so the centerline through the nozzle and valve is perpendicular (90°) to the manifold centerline.
10. Connect the pilot air tubing to the valve tube fitting.
11. Install the access panel.

Pulse Valve Replacement (contd)

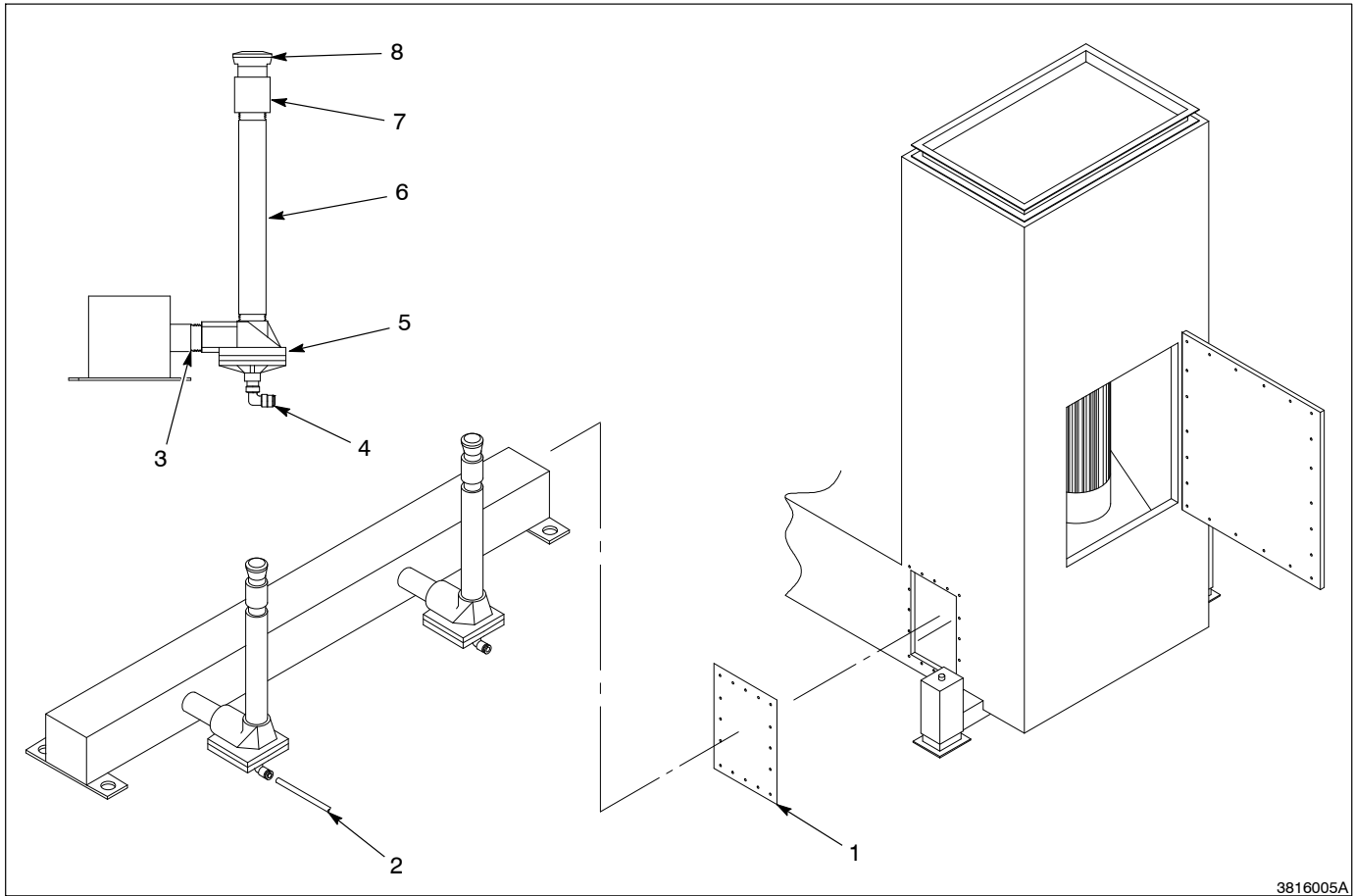


Fig. 7 Pulse Valve Replacement

- | | | |
|---------------------|-------------------|-------------|
| 1. Access panel | 4. Tube fitting | 7. Coupling |
| 2. Pilot air tubing | 5. Pulse valve | 8. Nozzle |
| 3. Manifold nipple | 6. Extension tube | |

V-Belt Replacement



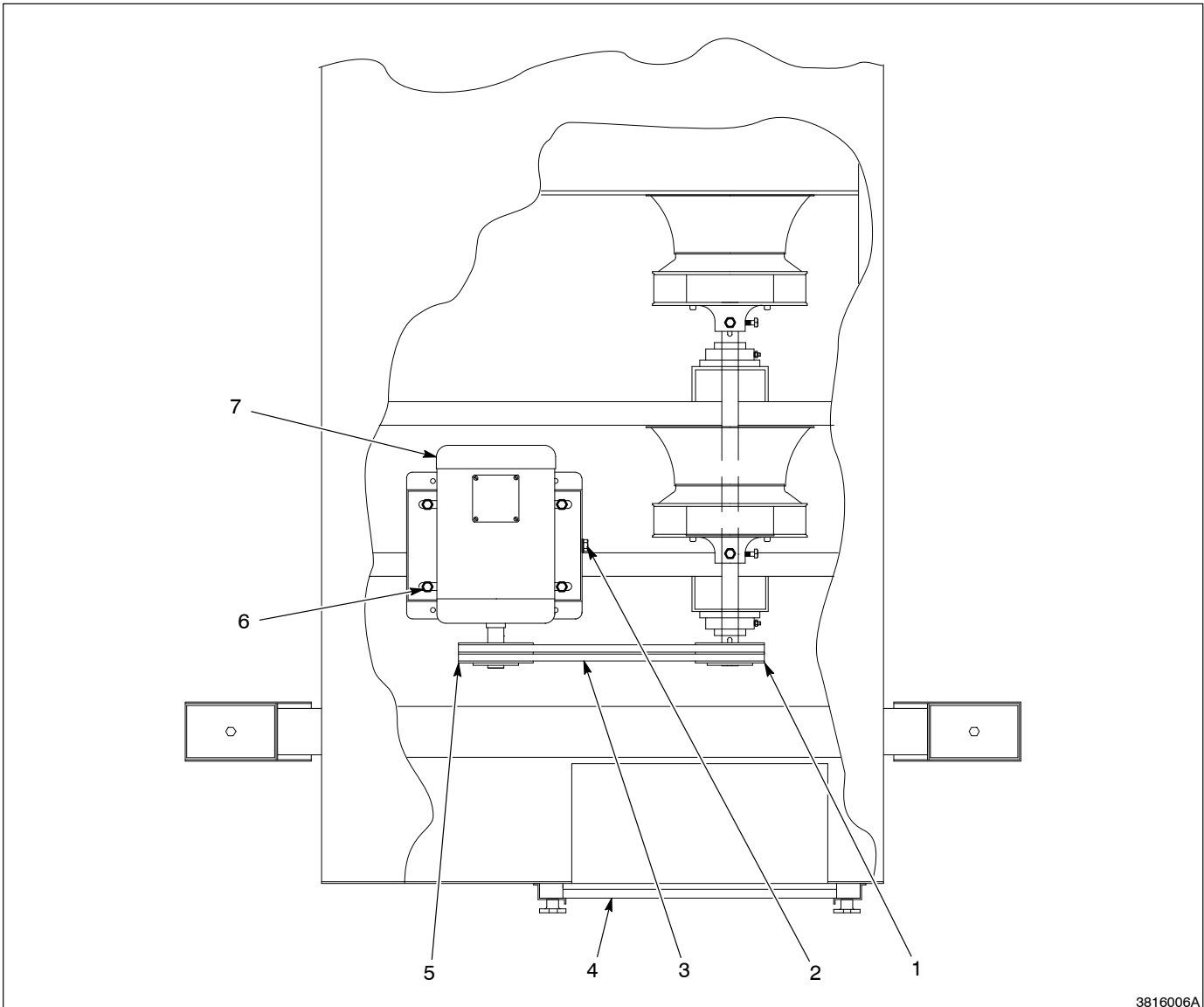
WARNING: Before performing the following procedure, shut off electrical power at the system electrical panel. Lock and tag the disconnect switch.

1. See Figure 8.

Remove the final filter (4) as described in the *Final Filter Replacement* procedure.

2. Loosen the nuts (6) securing the motor adjustment plate.
3. Turn the tension screw (2) on the motor mounting plate to move the motor toward the fan and loosen the V-belts (3).
4. Rotate the motor (7) and roll the V-belts off the sheaves (1, 5).
5. Roll the new belts onto the sheaves and seat the V-sections in the sheave grooves. Use only properly sized, matched belts.
6. Turn the tension screw to move the motor away from the fan and tension the belts.
7. Check the belt tension by pressing on the belts midway between the sheaves. You should not be able to deflect the belts more than 12.7–19.0 mm (0.50–0.75 in.) or one belt diameter.
8. Tighten the nuts to secure the motor adjustment plate.
9. Install the final filter as described in the *Final Filter Replacement* procedure.

V-Belt Replacement (contd)



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Fig. 8 V-Belt Replacement

- | | | |
|------------------|-----------------|----------|
| 1. Fan sheave | 4. Final filter | 6. Nuts |
| 2. Tension screw | 5. Motor sheave | 7. Motor |
| 3. V-belts | | |

Sheave Replacement



WARNING: Before performing the following procedure, shut off electrical power at the system electrical panel. Lock and tag the disconnect switch.

NOTE: The cap screws shipped with the bushing are hardened. Do not use softer-grade screws to break the bushing loose from the sheave. The ends of the screws will flatten, preventing you from removing them from the bushing.

1. Remove the V-belts as described in the *V-Belt Replacement* procedure.
2. See Figure 9.

Unscrew the three cap screws (8) and remove them from the unthreaded holes (9) in the bushing (4). Thread the screws through the threaded holes (5) in the bushing until they bottom out on the sheave (3).

3. Tighten the screws evenly, a quarter turn at a time, until the bushing breaks loose from the sheave.
4. Pull the sheave, bushing, and key (6) off the shaft (7). Remove the screws from the bushing. Inspect the sheave, bushing, and key, and replace them if they are damaged. Clean the parts that will be reused.

NOTE: Do not lubricate the sheave, bushing, or motor shaft.

5. Install the sheave and bushing on the shaft. Line up the unthreaded holes in the bushing with the threaded holes in the sheave, and the keyway in the bushing with the keyway in the shaft.
6. Install the key into the keyways.
7. Install the three cap screws through the unthreaded holes in the bushing and thread them into the sheave.

Sheave Replacement (contd)

8. Place a square across the top of the fan and motor sheaves (1, 2). Slide the sheave and bushing up the shaft until both sheaves are parallel with each other. If the sheaves are not parallel, the belts will wear prematurely.



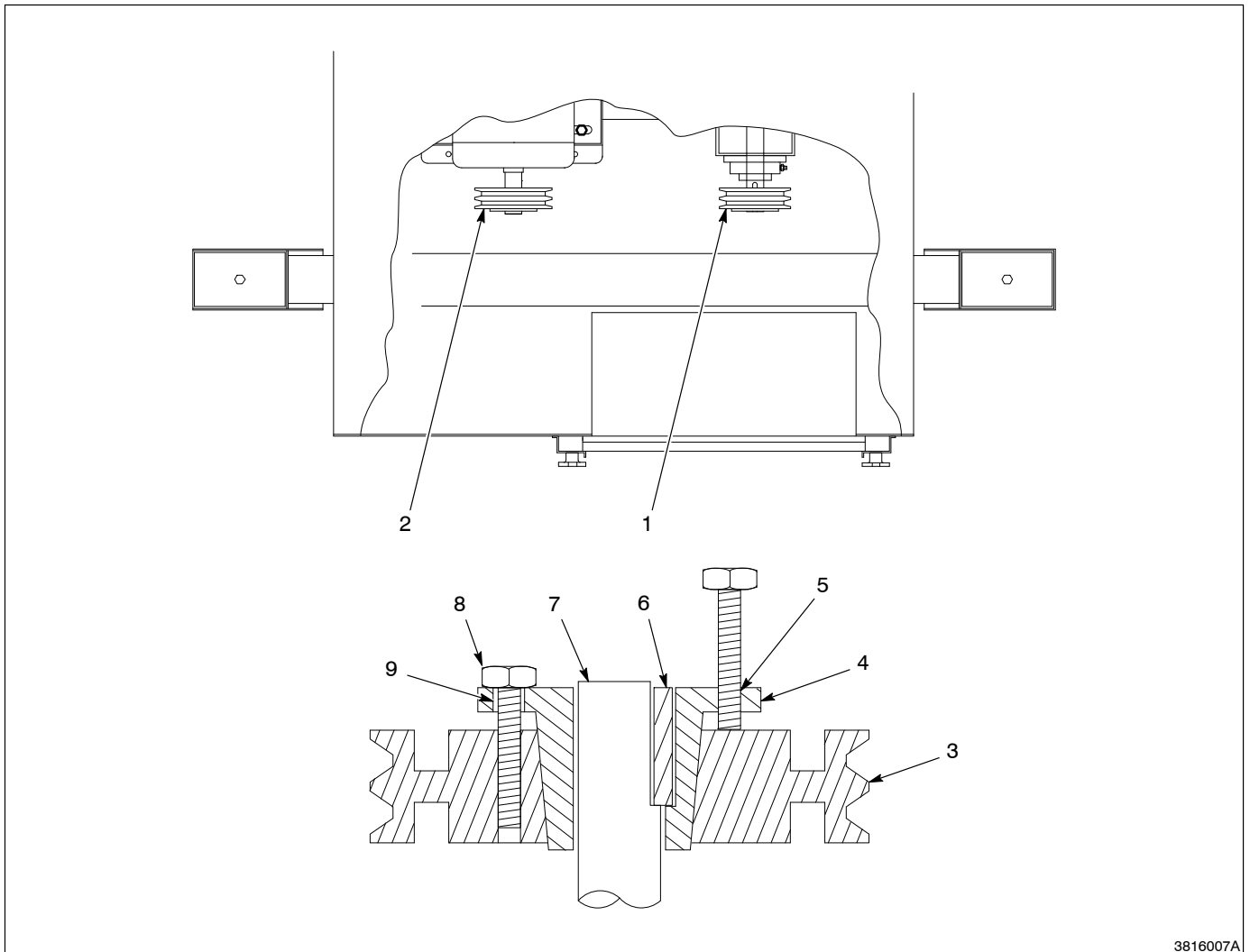
CAUTION: Do not overtighten the motor-bushing cap screws. You could crack the sheave hub, or break off the screws. If the sheave pulls up against the bushing flange, the shaft diameter is too small.

9. Tighten the cap screws evenly, a quarter turn at a time, to the specifications in Table 2. This will pull the sheave and bushing together. Maintain a gap of 3.175–6.350 mm (0.125–0.250 in.) between the bushing flange and the sheave.

Table 2 Motor-Bushing Cap-Screw Torque and Pull Specifications

Screw Size (in.)	Torque N•m (ft-lb)	Open-End or Socket Wrench	
		Length mm (in.)	Pull kg (lb)
1/4	12 (9)	102 (4)	12 (27)
5/16	20 (15)	152 (6)	14 (30)
3/8	40 (30)	152 (6)	27 (60)

10. Check again to make sure the motor and fan sheaves are parallel with each other. If they are not, separate the bushing and sheave and repeat the installation steps.
11. Install the V-belts as described in the *V-Belt Replacement* procedure.



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Fig. 9 Sheave Replacement

- | | | |
|-----------------|-------------------|---------------------|
| 1. Fan sheave | 4. Bushing | 7. Shaft |
| 2. Motor sheave | 5. Threaded holes | 8. Cap screws |
| 3. Sheave | 6. Key | 9. Unthreaded holes |

Motor Replacement



WARNING: Before performing the following procedure, shut off electrical power at the system electrical panel. Lock and tag the disconnect switch.

1. Remove the final filter as described in the *Final Filter Replacement* procedure.
2. Remove the cover from the motor junction box. Tag and disconnect the wiring from the motor leads. Disconnect the conduit from the junction box.
3. Remove the V-belts, as described in the *V-Belt Replacement* procedure, from the motor sheave.
4. Remove the nuts and washers securing the motor to the motor adjustment plate.
5. Remove the motor from the fan section and move it to a clean work area.
6. Remove the motor sheave and bushing from the motor as described in the *Sheave Replacement* procedure.
7. Install the new motor on the motor adjustment plate with the nuts and washers. Do not tighten the nuts until you install and tension the V-belts.
8. Install the motor sheave and bushing on the motor shaft as described in the *Sheave Replacement* procedure.
9. Install the V-belts on the sheave and adjust the belt tension as described in the *V-Belt Replacement* procedure.
10. Remove the cover from the motor junction box. Connect the conduit to the motor junction box and the wiring to the motor leads. Reinstall the cover.
11. Turn on the system electrical power and start the exhaust fan. Check the direction of air flow through the final filter. If air is being pulled into the final filter, the motor is rotating in the wrong direction. Refer to the *Reversing Motor Direction* section in *Troubleshooting*.

Fan, Fan Shaft, and Bearing Replacement



WARNING: Before performing the following procedure, shut off electrical power at the system electrical panel. Lock and tag the disconnect switch.

1. Remove the final filter as described in the *Final Filter Replacement* procedure.
2. Remove the V-belts as described in the *V-Belt Replacement* procedure.
3. See Figure 10.

Remove the access panel to gain access to the rear fan (6).

4. Loosen the bearing-race set screws on both bearings (2, 5).
5. Slowly pull the fan shaft (10) 25.4 mm (1 in.) toward the final filter opening.
6. Loosen the key and shaft set screws (8) in the hubs of both fans (3, 6).
7. Pull the fan shaft forward until you can remove the rear fan. Save the key for reuse.
8. Continue to pull the fan shaft toward the final filter opening until the front fan (3) can be removed. Save the key for reuse.
9. Remove the fan shaft from the front bearing (2).
10. Remove the fan sheave (1) as described in the *Sheave Replacement* procedure.

Fan, Fan Shaft, and Bearing Replacement *(contd)*

11. If you are replacing the bearings, perform the following steps:
 - a. Disconnect the grease tubing from the tube fittings (9).
 - b. Remove the screws, washers, and nuts securing the bearings to the vertical supports.
 - c. Remove the grease fittings from the new bearings and replace them with the tube fittings from the old bearings.
 - d. Install the new bearings on the supports with the screws, washers, and nuts. Do not tighten the nuts. Connect the grease tubing to the tube fittings.

12. Install the fan shaft through the bearings, and fan hubs. Make sure you install the fan hub keys while you are doing this. If you have any trouble getting the shaft through the bearings, try one or more of the following steps:
 - a. Loosen the bearing-race set screws.
 - b. Clean the shaft and ID of the bearing inner-race with a clean cloth and a small amount of penetrating oil. Do not get any oil inside the bearing races. The penetrating oil will dissolve the grease needed to lubricate the bearings.
 - c. Gently drive the shaft through the bearings with a soft-faced mallet or a hammer. If you use a hammer, place a block of wood on the end of the shaft and strike the wood, not the shaft.
 - d. Chill the shaft in a freezer or with dry ice and install it through the bearings while it is cold.

13. Level the shaft and square it with the vertical supports. Tighten the screws securing the bearings to the supports using the torque values in Table 3. Do not tighten the bearing race set screws yet.

Table 3 Bearing Mounting Screw Torque Values

Screw Size (in.)	Torque N•m (in.-lb)
3/8-16	27 (240)
1/2-13	68 (600)
5/8-11	135 (1200)
3/4-10	236 (2100)
7/8-9	230 (2040)

14. Install the fan sheave, bushing, and key on the shaft. Tighten the bushing cap screws enough to hold the sheave on the shaft. Refer to the *Sheave Replacement* procedure.
15. Place a square across the motor and fan sheaves. Adjust the fan shaft forward or back until the sheaves are parallel.
16. Square the shaft with the support and tighten the bearing-race set screws. Tighten the set screws to the torque values in Table 4.
17. Tighten the fan sheave bushing screws to the torque values given in the *Sheave Replacement* procedure. Use the square to make sure the sheaves are parallel.

Table 4 Recommended Torque Values For Bearing Set Screws

Set Screw Size (in.)	Hex Key Size (in.)	Torque N•m (in.-lb)	
		Std. Ball Bearing	Stainless Steel
#10	3/32	3 (30)	3 (25)
1/4	1/8	8 (73)	7 (60)
5/16	5/32	16 (141)	13 (117)
3/8	3/16	28 (251)	23 (206)

Fan, Fan Shaft, and Bearing Replacement *(contd)*

18. Adjust the position of the fans on the shaft. The fans should fit inside the inlet cones (4, 7) 3.175–6.350 mm (0.125–0.250 in.). Torque the shaft and key set screws in each fan hub to 3.5 N•m (30.9 in.-lb).
19. Rotate the fans and make sure the gaps between the fans and the inlet cones are the same all the way around. Use your finger to check the gaps. If the fans rub against the inlet cones, loosen the screws securing the inlet cones to the fan section. Adjust the cone positions and tighten the screws.
20. Install the V-belts on the sheaves and adjust the belt tension as described in *V-Belt Replacement*.
21. Turn on the system electrical power and start the exhaust fans. If you notice any noise caused by the fans rubbing against the inlet cones, stop the fans, lock out power, and readjust the cone positions. If you hear a rumbling noise coming from the bearings, stop the fans, lock out power, and check the fan shaft alignment.

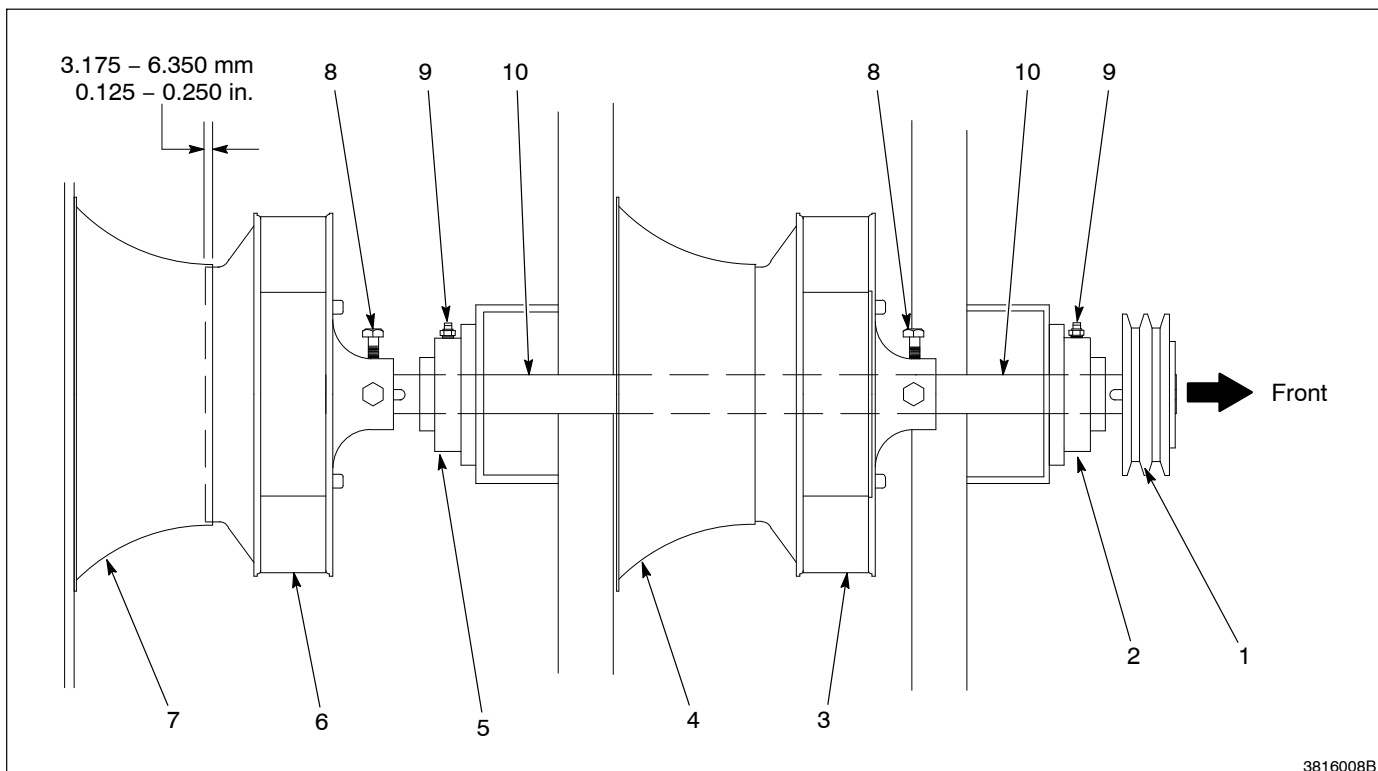


Fig. 10 Fan, Fan Shaft, and Bearing Replacement

- | | | |
|---------------------|--------------------|-----------------------------|
| 1. Fan sheave | 5. Rear bearing | 8. Shaft and key set screws |
| 2. Front bearing | 6. Rear fan | 9. Tube fittings |
| 3. Front fan | 7. Rear inlet cone | 10. Fan shaft |
| 4. Front inlet cone | | |

7. Parts

To order parts, call the Nordson Customer Service Center or your local Nordson representative. Use this five-column parts list, and the accompanying illustration, to describe and locate parts correctly.

Using the Illustrated Parts List

Numbers in the Item column correspond to numbers that identify parts in illustrations following each parts list. The code NS (not shown) indicates that a listed part is not illustrated. A dash (—) is used when the part number applies to all parts in the illustration.

The number in the Part column is the Nordson Corporation part number. A series of dashes in this column (- - - - -) means the part cannot be ordered separately.

The Description column gives the part name, as well as its dimensions and other characteristics when appropriate. Indentions show the relationships between assemblies, subassemblies, and parts.

Item	Part	Description	Quantity	Note
—	000 0000	Assembly	1	
1	000 000	• Subassembly	2	A
2	000 000	• • Part	1	

- If you order the assembly, items 1 and 2 will be included.
- If you order item 1, item 2 will be included.
- If you order item 2, you will receive item 2 only.

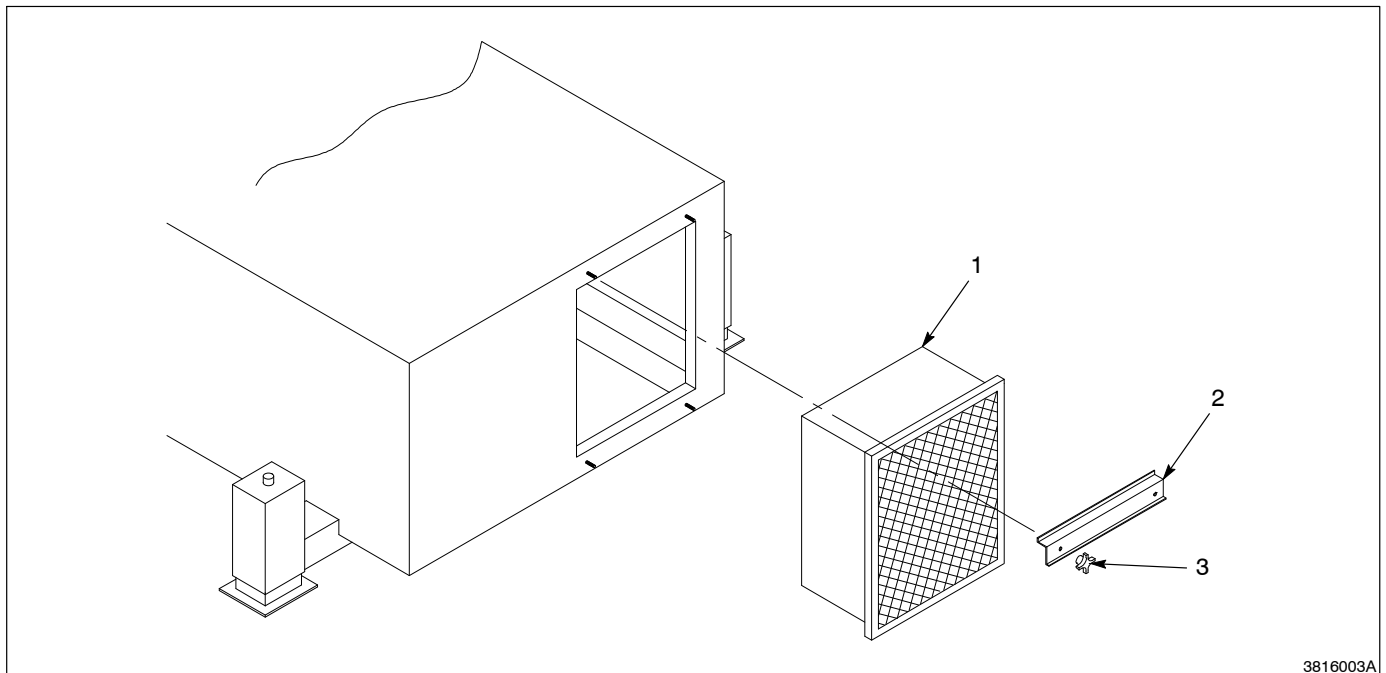
The number in the Quantity column is the quantity required per unit, assembly, or subassembly. The code AR (As Required) is used if the part number is a bulk item ordered in quantities or if the quantity per assembly depends on the product version or model.

Letters in the Note column refer to notes at the end of each parts list. Notes contain important information about usage and ordering. Special attention should be given to notes.

Final Filters and Mounting Hardware

See Figure 11.

Item	Part	Description	Quantity	Note
1	156 995	Filter, final, 24 x 20 in., internal	1	
2	176 366	Bracket, final filter, 18.50 x 2.75 in.	2	
3	176 367	Knob, final filter	4	



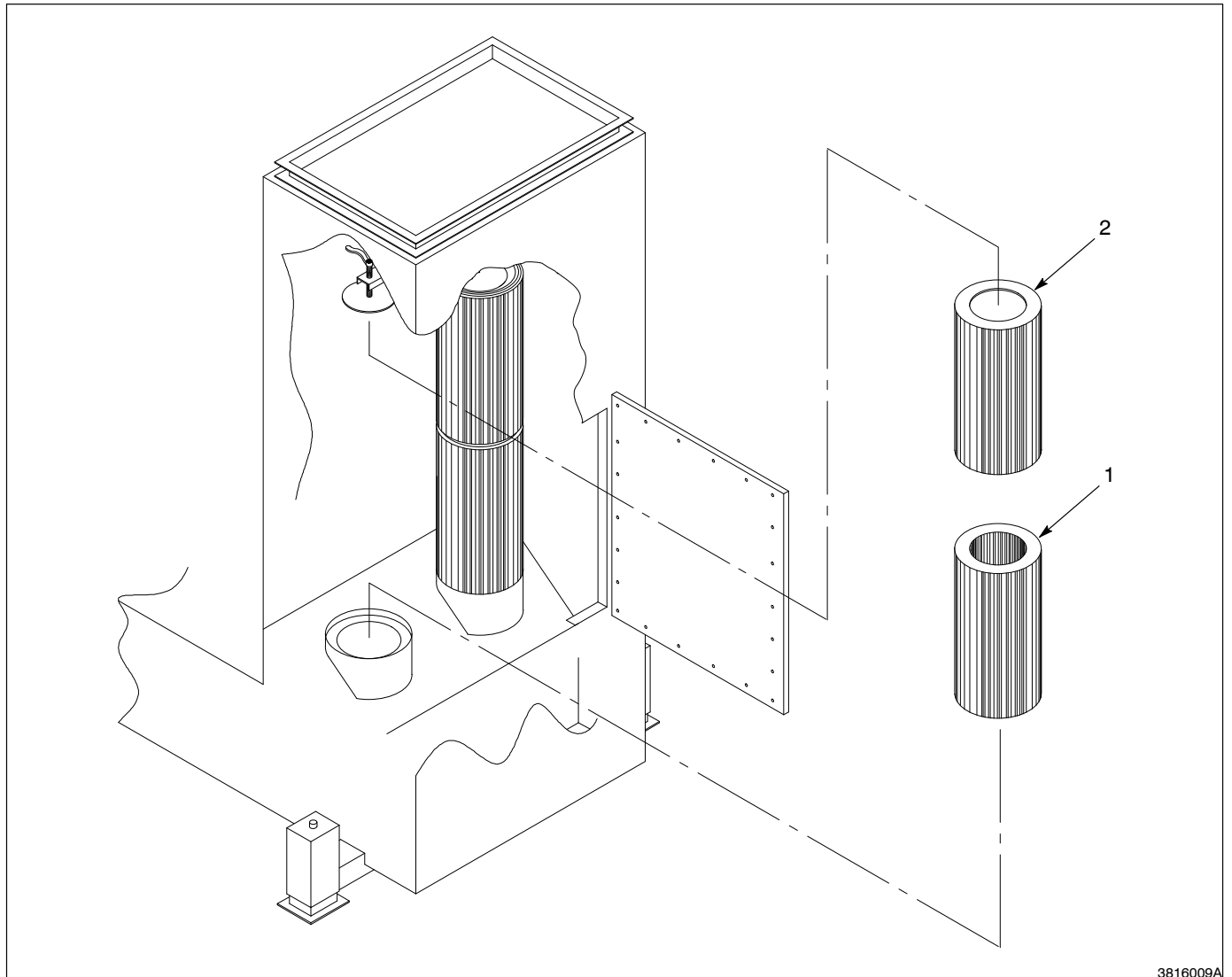
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Fig. 11 Final Filters and Mounting Hardware

Cartridge Filters

See Figure 12.

Item	Part	Description	Quantity	Note
1	151 085	Filter, 36 in., PowderGrid flow through	2	
2	151 086	Cartridge, filter, 36 in., PowderGrid closed end	2	



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Fig. 12 Cartridge Filters

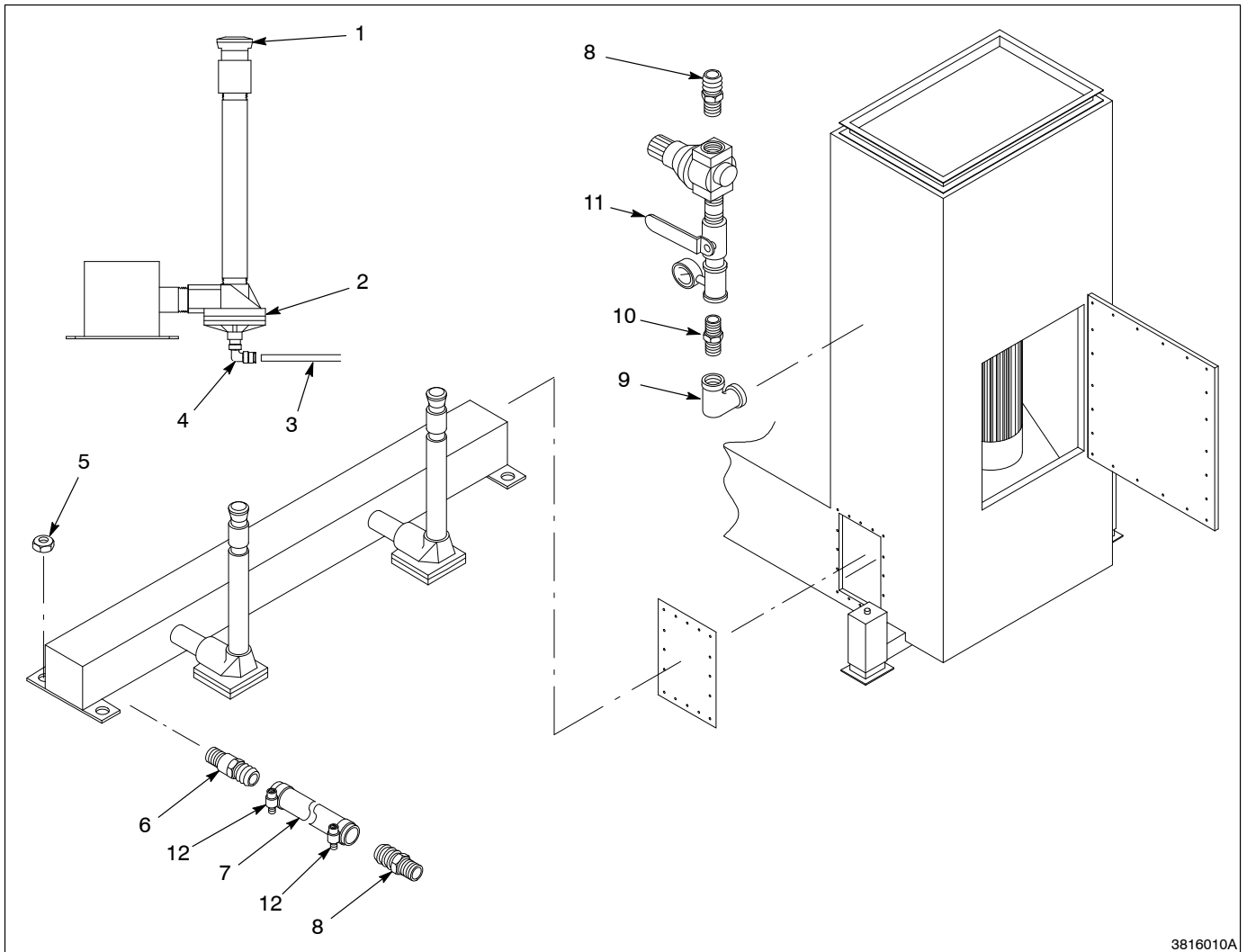
Pulse Valves

See Figure 13.

Item	Part	Description	Quantity	Note
1	165 726	Nozzle, cartridge pulse	2	
2	174 824	Valve, pulse, 1 in. NPT, cast tube	2	
NS	183 944	Kit, repair, pulse valve	1	
3	900 742	Tubing, 6 mm, blue, polyurethane	AR	
4	972 126	Fitting, elbow, 6 mm tube x 1/8 universal thread	2	
5	984 150	Nut, lock	4	
6	178 971	Fitting, brass, barbed, 3/4 in. hose x 3/4 in. NPT	1	
7	124 792	Hose, black, 3/4 in.	AR	
8	178 971	Fitting, brass, barbed, 3/4 in. hose x 3/4 in. NPT	2	
9	973 519	Elbow, pipe, 90°, 3/4 in. NPT, galvanized	1	
10	-----	Nipple, close, 3/4 in. NPT	1	
11	176 301	Control, air volume	1	
12	713 553	Clamp, hose, worm drive	2	

AR: As Required

NS: Not Shown



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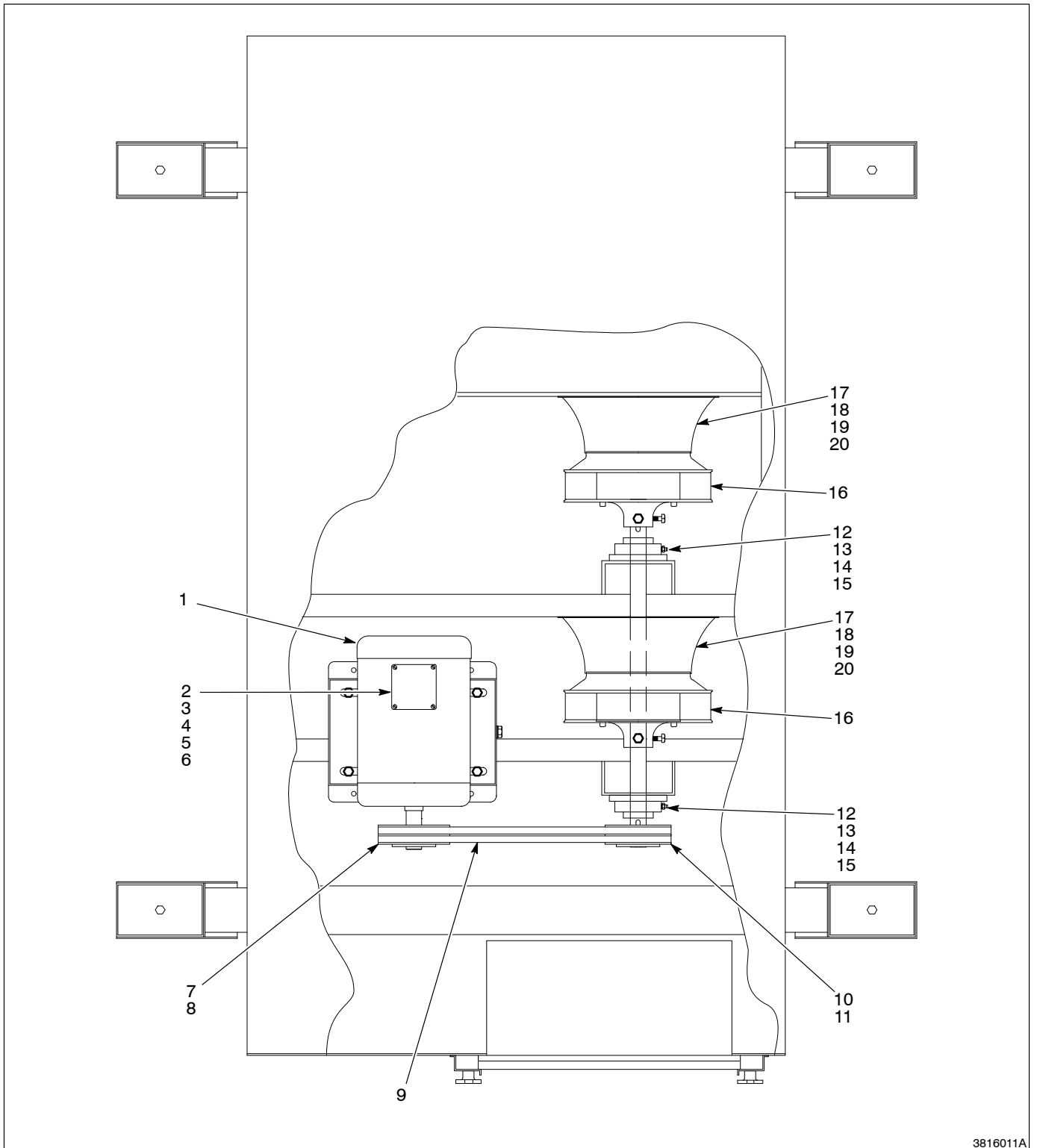
Fig. 13 Pulse Valves

Fan and Fan Drive

See Figure 14.

Item	Part	Description	Quantity	Note
1	-----	Motor	1	
2	-----	Nipple, close, 1 NPT	AR	
3	983 096	Washer, sealing conduit, 1 in. NPT	AR	
4	177 629	Elbow, 90°, 1 in.	AR	
5	803 874	Fitting, 1 in., flexible, conduit	AR	
6	939 580	Conduit, flexible, liquid tight, 1 in.	AR	
7	174 789	Sheave, motor	1	
8	-----	Bushing, motor sheave	1	
9	-----	V-belt	2	
10	174 784	Sheave, fan	1	
11	-----	Bushing, fan sheave	1	
12	-----	Bearing, fan	2	
13	983 007	Washer, flat, e, 0.531 x 1.000 x 0.063 in., zinc	AR	
14	983 180	Washer, lock, e, split, 1/2 in., nickel-plated steel	AR	
15	981 611	Screw, hex head, 1/2-13 x 1 in., cap, zinc	AR	
16	-----	Wheel, fan	2	
17	-----	Cone, inlet	2	
18	981 315	Screw, hex head, 5/16-18 x 1 in., cap, zinc	AR	
19	983 150	Washer, lock, e, split, 5/16 in., nickel-plated steel	AR	
20	983 527	Washer, flat, 0.344 x 1.125 x 0.063 in., zinc	AR	

AR: As Required



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Fig. 14 Fan and Fan Drive

